CONTENTS

TELEVISION COURSE—INSTALLMENT No. 14

TRADE NAME	MODEL	FOLDER NO.
Aircastle	5029	4821-1
Airline	64BR-7000A	4821-2
Airline	84GDC-963B	4821-3
Bendix	55L2, 55L3, 55P2, 55P3	4821-4
Crosley	9-117	4821-5
Garod	4B-1	4821-6
General Electric	113	4821-7
General Electric	210, 211, 212	4821-8
Hoffman	C-502, C-512	4821-9
Jewel	814	4821-10
Learadio	Chassis R-971	4821-11
Mantola	R-76262 (Fact. No. 7160-17)	4821-12
Masco	MA-12HF	4821-13
Motorola	VK101, VT101, VF102 Television Receiver	4821-14
Philco	48-1286	4821-15
Philco	49-902	4821-16
Phonola	K-92, K-104	4821-17
RME	VHF-152A	4821-18
Silvertone	8100 (Ch. 101.829)	4821-19
Silvertone	9260 (Ch. 101.850)	4821-20
Sparton	6-66A (Ch. 666A)	4821-21
Tele-Tone	182	4821-22
Truetone	D1850 (Series A)	4821-23
Truetone	D3722 (Fact. No. 472)	4821-24
Westinghouse	H-188 (Ch. V-2133)	4821-25

The PHOTOFACT Servicer

DEC. 1, 1948 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ VOL. 6, No. 51

ROBERT M. ELLIS, *Editor*

HOW TELEVISION GROWS!

Half the population of the United States will be living in areas served by television by the end of 1948, according to Joseph B. Elliott, V.P. in Charge of RCA Victor Home Instrument Department, who spoke before a meeting of the Engineering Society of Detroit. He predicted that heavy public demand will cause present television receiver shortages to increase before they can be relieved. RCA's newest experimental theatre television system, presenting instantaneous televised pictures 20 x 15 feet in size with a smaller projection unit than any previously developed for this purpose, was demonstrated.

"A third of the nation's population lives within service range of television," Mr. Elliott said. "By the end of the year, about half the population should be within reach of at least one television station."

★ ★

NEW RECORD CHANGER MANUAL!

Service technicians will be happy to know that Volume 2 or the new 1948 Edition of the "Howard W. Sams Record Changer Manual" will be available the latter part of this month or the first of next.

The new Volume 2 gives over 400 pages of brand new technical data including complete coverage of 31 standard single-speed record changers, 4 dual speed record changers, 4 wire recording units, and 4 tape recording machines. The 44th is the Webster 133 designed for Microgroove records exclusively, while the 45th is the Sentinel 1ATA Phonograph Player which operates with a lid closing switch assembly.

Wire recorders covered are—

Wire Recording Corporation of America, "Wireway' '
RCA (Magazine Loading Unit)
Lear (Dynaport)
Crescent 1000 Series

Tape recorders covered are—

The International Electronics Corp.
Magnecord, Inc. (Audiad)
Brush Development Company—BK 411, BK 403.

The price?—only $6.75, net to service technicians. You will be delighted with the new book. Order your copy from your parts jobber today.

★ ★

PHOTOFACT TELEVISION COURSE TO APPEAR AS BOOK

The PHOTOFACT Television Course, appearing currently in a series of instalments in PHOTOFACT Folders, will soon be available in bound book form.

The decision to publish the Course as a book provides a solution to the overwhelming demand we have had for copies of the Course from sources *outside* of the radio service profession.

Our original intention was to offer the TV Course with PHOTOFACT Folders at no extra cost to subscribers. We spared no expense to make the Course as authentic, practical and complete as it could possibly be on the basis of available information and material. The response of the servicing profession has been universally enthusiastic.

What we did not anticipate was the tremendous demand for copies of the Course from companies and individuals in all fields of the Radio Industry, apart from the service business. It is evident that the PHOTOFACT Television Course is a presentation of television principles useful throughout the industry.

We are, therefore, publishing the Course in book form as a service to the entire Radio Industry, and as a service, are planning to make it available at the lowest possible price. The book will contain all fifteen instalments which will comprise the complete Course appearing in PHOTOFACT Folders, plus a glossary of television terms and an extensive bibliography of television literature. The Course in book form will be available in late January, or early February. Tell your friends about it.

BOUQUETS

One of the biggest rewards that can come in any enterprise is the approval and commendation of our fellows. Here are excerpts from some of our correspondence that we really liked.

"Have just examined your Folder on the Emerson TV Model 571. It couldn't be better, and I'm looking forward to more sets like this. They can't come out too fast for me. Sometimes I think what a wonderful thing it would have been for the serviceman if we could have had Sams PHOTOFACT service since 1928."

*St. James, Minn.

"The removable specification sheets in the filing sleeve in Set 46 are tops; and is much simpler than trying to juggle an entire manual while fumbling a gated or folded page, or following a schematic over two, three or four separate pages."

*Baltimore 29, Maryland

"I must hand it to you folks at Howard Sams' for your splendid and up-to-the-minute data on this model (Emerson 571-606 TV). It is one of the finest pieces of data I have had the pleasure to receive."

*Philadelphia 22, Pa.

"—let me congratulate you on the excellence of your first Television PHOTOFACT presentation."

*New Orleans 15, La.

"—I wish to commend you and your associates for the great work your company is doing for the radio man."

*Camden, New Jersey

*Names available on request.

★ ★

CLAROSTAT MOVES

The Clarostat Manufacturing Company, one of our charter participants, announces the removal of their office and factory from Brooklyn, New York. Their new address will be Dover, New Hampshire, just an hour's ride out of Boston.

★ ★

ADDED FEATURE

The Quam-Nichols Company, one of the participating manufacturers whose products are listed in PHOTOFACT Folders, has asked us to announce that in the future Quam Adjust-A-Cone Speakers in sizes from 3½" to 6" will come equipped with their Universal Mounting Bracket.

★ ★

FIELD EXPERIENCES

Here is your opportunity for passing practical service experiences to others for the benefit of all. For every service "Field Experience" published, we issue to the author a certificate that is good for one PHOTOFACT Folder Set. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Company, Inc.

★ ★

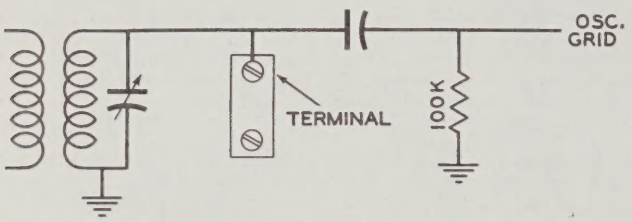
RCA 54B2
Photofact Set 7, Folder 22

"I had an RCA 54B2 personal portable with oscillator trouble. The set would work at times and would act very much like it had a weak 1R5. I tried several replacement tubes but had the same results with all of them. I replaced the oscillator coil and finally all other parts in

the circuit except the tuning condenser; and I check this thoroughly several times.

"I was about to give up when I recalled that the set worked good on hot dry days but would not oscillate on the more humid days. I tried cooking the set with an infra-red lamp as much as I thought the condensers would allow. The set would then play until it cooled off. From this I reasoned that a tube socket or some of the wiring may have been saturated at some time and were still damp or moist. I have seen sets on which Coca-Cola or beer had been spilled, and it caused much trouble.

"I finally found the trouble to be caused by leakage in the small bakelite terminal or tie point, located at the end of the A cells, and to which is connected the oscillator coil grid lead. At some time previous to coming to my shop the 'A' battery had been allowed to run completely down; and fluids from the battery had saturated the terminal. There was no corrosion or visual indication of what had happened and I found the trouble only after removing the terminal and examining it closely.



"A resistance reading across the coil secondary was of no value in locating the trouble as the coil reads only 4 to 5 ohms and the actual leakage was around 5,000 ohms."

Submitted by: Mr. Daniel F. Owen, Owen's Radio Service, P. O. Box 5, Fayetteville, N. C.

★ ★

WILCOX-GAY RECORDIO 6B, 7D AND 7E

"Complaint: Inoperative tuning eye.

"Several cases have been reported where the tuning eye has become inoperative, however the RECORDIO itself works satisfactorily.

"Apparently we received from our supplier a quantity of 1 megohm resistors that tested o.k. but after use broke down due to some manufacturing defect. Therefore, in case the complaint is 'tuning eye not working' replace the 1 megohm, ¼ watt, resistor in the tuning eye socket. This resistor is standard and is probably in most dealers' service stock."

Information Courtesy: Mr. W. E. McConnell, Service Sales Manager, Wilcox-Gay Corporation, Charlotte, Michigan

★ ★

PONTIAC 984249
Photofact Pending

"Complaint: Audio Howl.

"An audio howl when the volume control is advanced may be caused by a ground in the voice coil circuit which makes the inverse-feedback circuit regenerative. For a quick check without disassembling the chassis, take a resistance reading between the output meter lug connectors and the ground. These are the two small lugs on the lower left corner of the front cover; and their normal resistance to the chassis is 275 to 300 ohms. The most common spot for a short to occur is through the rivets that hold these lugs.

"A ground on the green lead from the output transformer (lower terminal) will cause an audio howl; a ground on the other terminal (black lead) will cause excessive high frequency response and will sound almost like a set with excessive amplification noise.

"This set, used on '48 Pontiac automobiles, is an 8-tube job with 1–0Z4, 1–6SA7, 2–6SK7, 2–6SQ7 and 2–6V6GT."

Submitted by: Mr. Francis C. Wolven, R. F. D. No. 2, Box 178, Saugerties, New York

★ ★

MOTOROLA 67F11, 67F12, 67F12B (CH. HS-63)
Photofact Set 31, Folder 20

"Intermittent operation on these sets may be caused by a defective 100 mmf. mica condenser (PHOTOFACT Item 22) that goes from the gang condenser to the No. 1 pin of the 12AU6 tube.

"If the set plays and then suddenly breaks into a hum, check the 6AQ6 tube for a short."

MOTOROLA OE8, SR8, CT8, KR-8 (CH. 8A)
Photofact Set 46, Folder 16

"Complaint: Binding automatic tuning.

"Make sure that the two copper plated slide rods running through the tuner are in place. These are held by two small clips that sometimes break or fall out. I fasten the rods by soldering them at the back.

"A frying noise in these sets has been traced to the second i.f. transformer.

"Intermittent operation and low volume has been checked to an open sensitivity control.

"Low volume on these sets has been checked to a volume control with a cracked carbon wafer."

Submitted by: Mr. Frank Krantz, Krantz Radio, 4627 Rising Sun Avenue, Philadelphia 40, Pennsylvania

★ ★

BUICK AUTOMOBILE SET 980650

"Complaint: Inoperative dial.

"In the Buick Sonomatic Radio I had a complaint that the dial would not turn when the set was on.

"I removed the front of the set and could see that the push-button lever spring was broken. To replace this spring would require extensive disassembling of the set. Repair can be made by drilling a 1/64" hole to the right and above the last push button, and a second through the lever. Install a light tension spring between the holes and the set will work perfectly."

Submitted by: Mr. Raymond Jones, 602 Monmouth Street, Winston Salem, N. C.

★ ★

TELETONE 145 CHASSIS "R" BATTERY—LINE OPERATED
Photofact Set 23, Folder 28

"Two of these sets in my shop would play on battery; but when hooked to the house current they would smoke. Replacing the selenium rectifier cured the trouble.

"Some of these sets go under the trade name of 'Arlington.'"

Submitted by: Lutz Radio Repairing, 1105 Hamilton Street, Allentown, Pennsylvania

★ ★

RADIOLA 75ZU (CH. RC-1063A)
Photofact Set 36, Folder 19

"Complaint: Low volume across the broadcast band.

"The trouble was located at the output transformer, PHOTOFACT Item 31. The primary was shorted to the iron core and repair was made by installing a new transformer. Looking at the schematic, it will be noticed that chassis is not at B-minus potential, so that this ground did not short-circuit the plate supply."

Submitted by: Mr. Frank Teicher, 717 E. 175th Street, New York 57, New York

SUBSCRIBE FOR PHOTOFACT FOLDERS!

Thousands of service technicians are buying PHOTOFACT Folders on subscription. They are keeping ahead of the procession by having service information on new sets as they appear on the market. The easy way to get your service information, the painless pay-as-you-go system that does not call for large annual or semi-annual outlays of cash is to buy your PHOTOFACT Folders in this manner. It costs no more; and you have the service data in your shop when you need it.

Two PHOTOFACT Folder Sets are issued each month. If you purchase open account or c.o.d., tell your distributor, "Please place my name on your list to receive PHOTOFACT Folders as they are published." If your business is on a cash basis, you can achieve the same result by paying in advance for several issues.

PHOTOFACT Folders are an asset, not an expense—they will pay for themselves over and over again, by the savings of time, material and effort that permit you to make more and better repairs per day.

If you have been unable to get any issues of PHOTOFACTS, send your order to us and we will see that you are supplied.

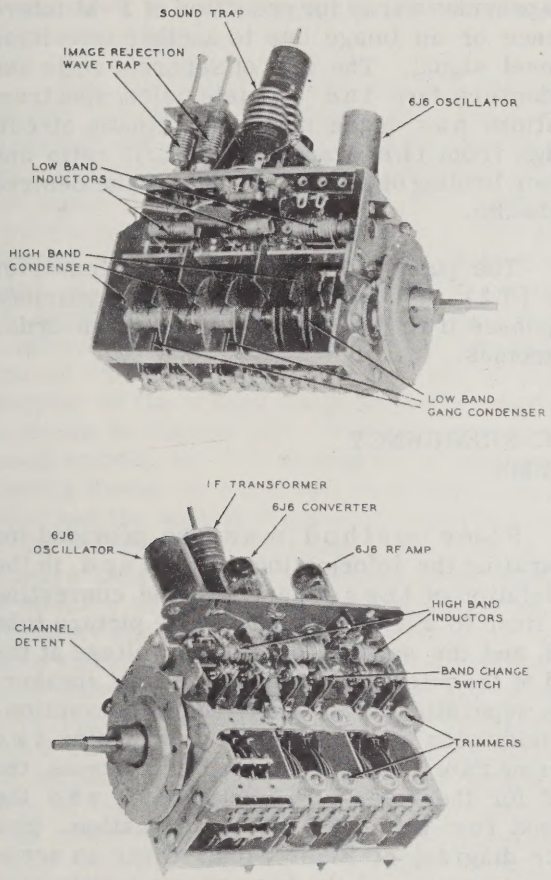


Fig. 182. An Input Tuning System Employing a Variable Gang Condenser with Mechanical Detent for Channel Selection. Photo from Sample Courtesy General Instrument & Appliance Corp.

INPUT SYSTEM EMPLOYING VARIABLE CONDENSER TUNING WITH MECHANICAL DETENT FOR CHANNEL SELECTION. Figure 182A and B illustrates the use of a special design of variable gang condenser for television tuning. The schematic diagram of the circuit employing this tuner is shown in Figure 183. The gang condenser itself is of special construction and employs separate sections for the tuning of the low and high frequency bands. The oscillator section (at the front of the unit) uses very thick soft copper plates to preclude the possibility of "microphonics". An ingenious mechanical arrangement provides a positive detent at each of the positions corresponding to a television channel. On the back side of the detent cam, there is a recessed groove in which a follower stud tracks continuously through 360 degrees of rotation. However, between channels 6 and 7 there is a step in the groove which actuates a lever arrangement controlled by the follower stud. This lever arrangement is attached to the shaft of a gang change-over switch, whose single pole, double throw sections are shown as S1, S2, S3, S4, S5, and S6 of Figure 183.

Referring to Figure 183, it will be noted that a separate set of coils, gang condenser sections, and trimmers, are employed for low band tuning as contrasted with high band tuning. The mechancial arrangement just described, automatically switches from one group of components to the other group, as the channel selector knob is turned from the lower to the higher television bands.

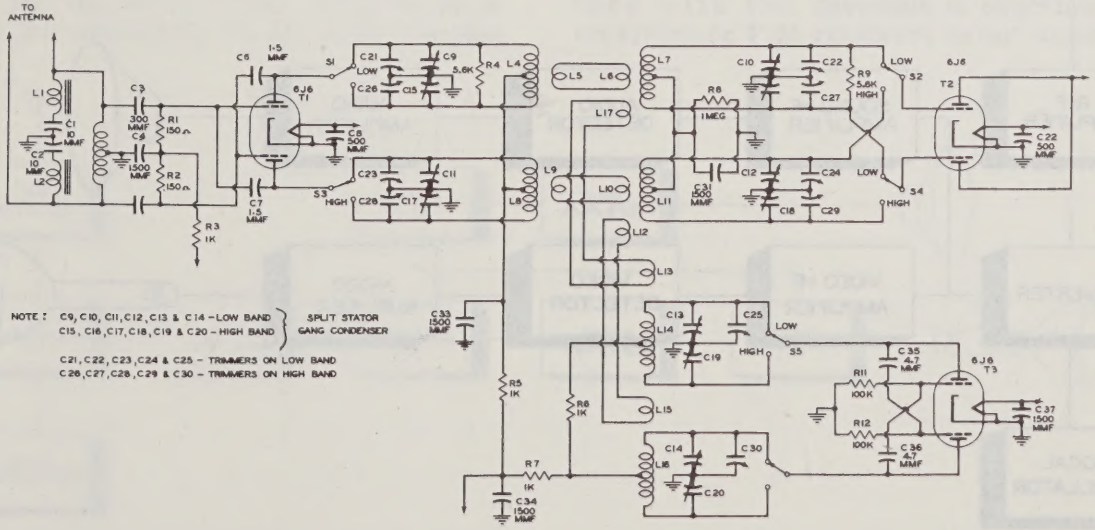

TO ANTENNA
NOTE: C9, C10, C11, C12, C13 & C14 - LOW BAND
C15, C16, C17, C18, C19 & C20 - HIGH BAND
SPLIT STATOR GANG CONDENSER
C21, C22, C23, C24 & C25 - TRIMMERS ON LOW BAND
C26, C27, C28, C29 & C30 - TRIMMERS ON HIGH BAND

Fig. 183. Schematic Diagram of Input Tuning System Shown in Figure 182.

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The following circuit features should be noted:

1. All tubes are dual triode type 6J6, and are operated in push-pull connection.

2. The R-F stage is cross-neutralized for stability and reduction of oscillator radiation. The input system is similar to that employed in the quarter-wave line type of tuner illustrated in Figures 171 and 172. This system provides matching for a balanced parallel wire, 300 ohm, transmission line, and also provides a trap for reduction of F-M interference or an image due to another television channel signal. The use of separate coils and condensers for the two television spectrum locations has made possible optimum circuit design from the standpoint of L/C ratio and proper loading of circuits to provide the desired bandwidth.

The push-pull operation of the converter tube (T2) allows rejection of spurious responses due to cancellation of even-order harmonics.

TELEVISION INTERMEDIATE-FREQUENCY AMPLIFIER SYSTEMS

In our discussion of the composite television signal, carrying amplitude-modulated video information and frequency-modulated sound (pages 121 - 132), it has been shown that a six megacycle wide channel (Figure 137A) is required. Since the television receiver is essentially a high frequency superheterodyne, the major part of the signal amplification and the required selectivity are obtained in the intermediate frequency amplifier system. The television intermediate frequency amplifier system differs in one major respect from the familiar broadcast or short-wave type. The signal which arrives at the grid of the converter consists of two carriers separated by 4.5 megacycles. These two are the video or picture carrier and the audio or sound carrier.

Some method must be provided for separating the information contained in the modulation of these carriers and converting the first to a video voltage at the picture tube grid, and the second to an audio voltage at the grid of the output tube feeding the loud speaker. This separation is accomplished in conventional television receivers by providing two intermediate frequency amplifier systems, the first for the video I-F amplification and the second for the audio I-F amplification. (See block diagram of Figure 184.) Since an accurate separation of the two carrier frequencies is provided at the transmitter by "crystal" control, the local oscillator of the receiver, by beating with the composite television signal, automatically produces two intermediate

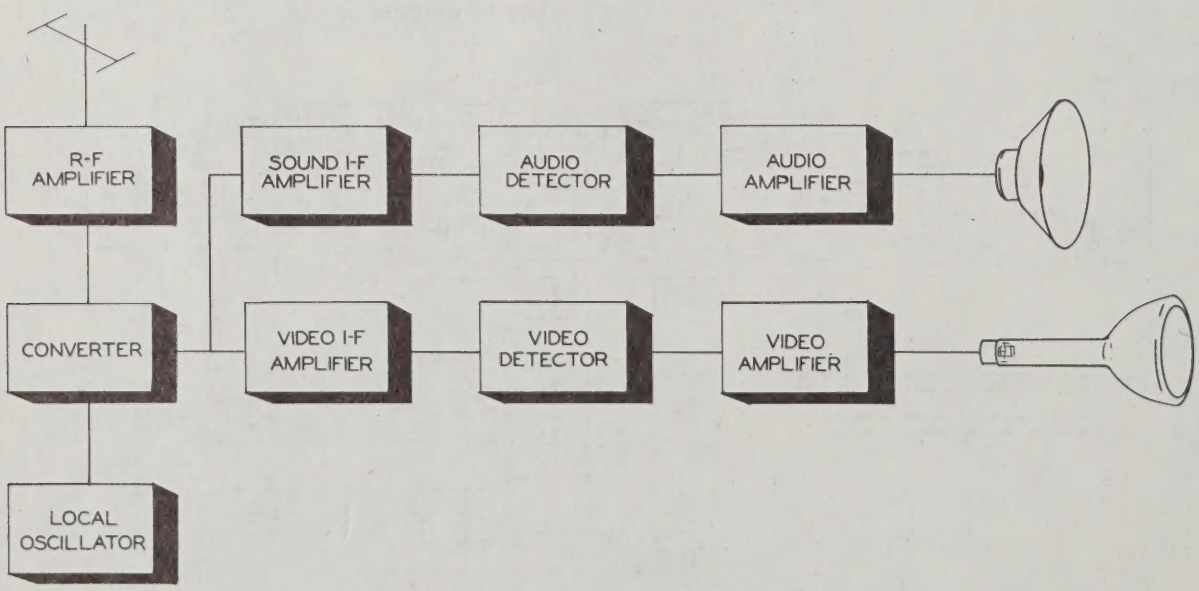

Fig. 184. Block Diagram of a Conventional Dual I-F Channel Television Receiver.

frequencies in the plate circuit of the converter (first detector).

The fact that the video carrier and audio carrier are always separated by a fixed difference of 4.5 megacycles, makes possible a very ingenious method of separating the video and audio signals. This system, which is known as "inter-carrier sound", "inter-channel sound", or "carrier difference reception", was proposed during the war as a means of simplifying military television equipment. It offers several advantages in the simplification of the television receiver. A block diagram of the "inter-carrier sound" system is shown in Figure 185. In the inter-carrier sound system, the I-F amplifier is made sufficiently broad in response to accept both the video and the audio I-F carriers. At the output of the second detector a new beat note of 4.5 appears between the two signals. This beat is in effect a new intermediate frequency and is frequency-modulated in accordance with the audio signal. It is also amplitude-modulated to some extent by the video or picture signal. Since the video amplifier is sufficiently wide band in response, this frequency-modulated 4.5 megacycle signal appears in amplified form at the picture tube grid. It is prevented from modulating the picture tube by the use of a trap circuit. The 4.5 megacycle signal, at the output of the video amplifier, is passed to an F-M detector and audio amplifier. The inter-carrier sound system will be considered in greater detail at the conclusion of our study of video amplifier systems.

Requirements of the I-F amplifier system are similar for either of the two basic systems just described, and are more complex than those encountered in broadcast receiver design.

In a broadcast type superheterodyne receiver, the I-F amplifier need pass a band of frequency extending only 10 kilocycles either side of the center frequency. In F-M receivers the bandwidth need be not more than + or - 200 kilocycles. In a television receiver the intermediate frequency amplifier must pass a band approximately 5 megacycles in width. Coupled with this band pass requirement is the necessity for rejection of interfering signals from the adjacent television channels (see Figure 139).

The factors which influence the choice of I-F frequency are:

1. Bandwidth requirement.

2. Selectivity.

3. Harmonics of the I-F frequency which might occur in a television band.

4. Direct I-F interference. (Signals of I-F frequency passing through the R-F amplifier.)

5. Image rejection due to F-M or television stations on the image frequency.

6. Cross modulation, due to television and F-M stations.

7. Oscillator radiation which will interfere with the operation of other television receivers or F-M receivers in the vicinity.

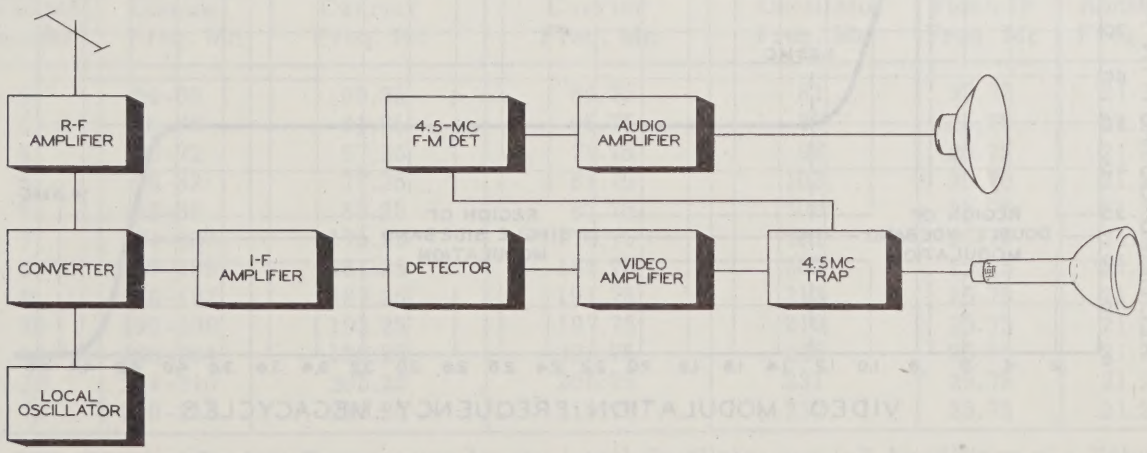

Fig. 185. Block Diagram of an Inter-Carrier Sound Television Receiver.

The choice of any particular intermediate frequency must be a compromise between the various factors just listed, but it appears that the higher intermediate frequencies are a better choice in all respects except direct I-F interference and stage gain.

VIDEO I-F SYSTEMS: The requirements of the video I-F system are fourfold.

1. The bandwidth must be sufficient to accept a total band approximately five megacycles wide.

2. Frequencies beyond the edges of the pass band must be rejected or attenuated to such an extent that they do not interfere with the picture. These frequencies are:

   a. The associated or co-channel sound must be rejected, or reduced to such an extent that "sound bars" do not appear in the picture.

   b. The sound carrier of the adjacent, lower-frequency channel (see Figure 139) must be rejected for the same reason.

   c. The video carrier, with its modulation, in the next higher adjacent channel must be rejected to prevent an interfering pattern on the picture.

3. The shape of the response characteristic of the video I-F amplifier must be such that the lower frequencies corresponding to the double side-band part of the transmission (Figures 137A and B, page 126) are properly attenuated to prevent over-emphasis.

REQUIRED RESPONSE CHARACTERISTICS OF THE OVERALL VIDEO SYSTEM. An analysis of the transmitter output shown in Figure 137A reveals the fact that the amplitude is constant from the video or picture carrier frequency to a carrier frequency approximately .75 megacycles lower and to a frequency of approximately 4 megacycles higher than the center of the video carrier. If such a carrier is impressed on a linear detector, the double side-band nature of the region below the picture carrier will result in an increased output for modulating frequencies extending from zero to 1.25 megacycles. Beyond this point the output will be reduced, since only one side-band is employed for frequencies higher than 1.25 megacycles. Figure 186 shows the output of such an ideal detector with an impressed signal from the transmitter modulated by a sweep signal which would produce the envelope of Figure 137A.

It will be seen that the output over the region of zero to .75 megacycles is twice that of the region from 1.25 megacycles to 4 megacycles, and that the output drops in an essentially linear fashion from .75 megacycles to 1.25 megacycles.

In order to compensate for this increased low frequency output, due to the lower side-

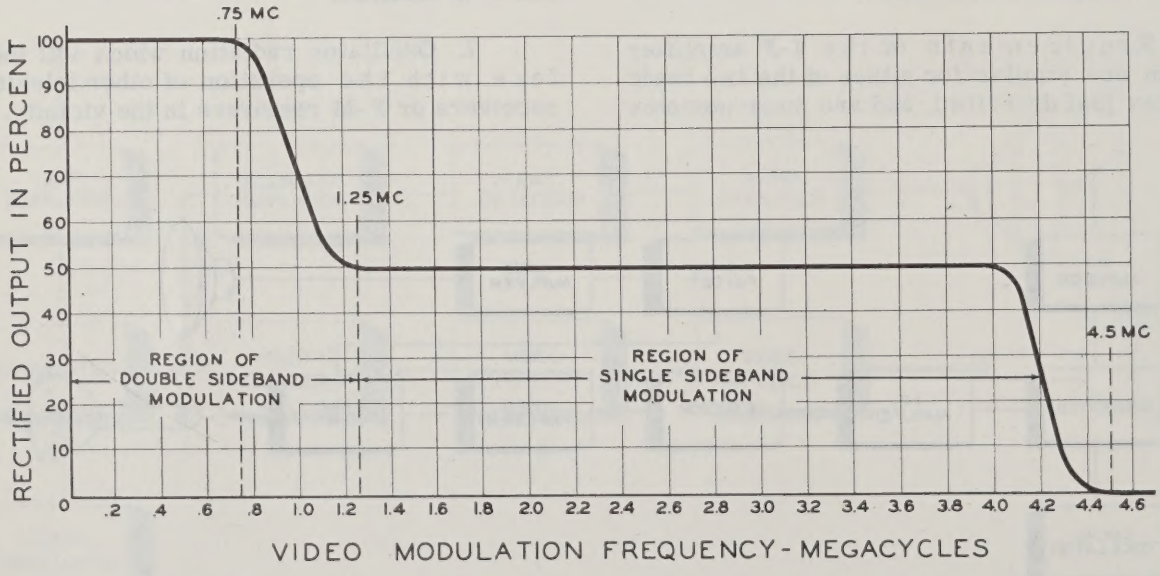

Fig. 186. Output of an Ideal (Linear) Detector when Rectifying the Vestigial Side-Band Modulated Television Video Carrier.

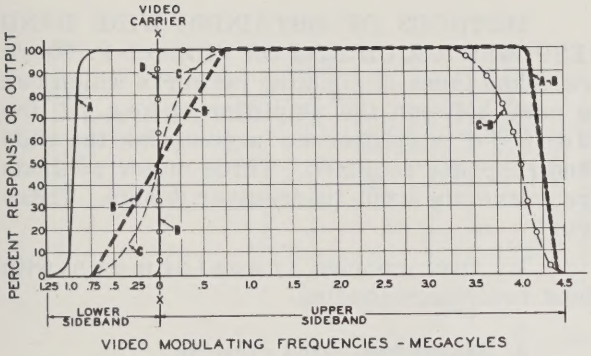

Fig. 187. Overall Receiver Characteristic Required to Compensate for Vestigial Side-Band Type of Modulation.

band, the overall response curve of the receiver should follow the linear slope of the curve shown as B in Figure 187. This curve passes the 50% response band at the frequency of the video carrier. In actual television receivers we find that the I-F curve is usually of the shape shown as C in Figure 187.

As long as the area under the curve to left of the line X-X is equal to the area above the curve to the right of the line X-X, these increments of the video detector output will add to produce the desired curve, D-D. Since the television receiver is normally tuned by means of the sound channel, it is of advantage to have as close an approach to the curve B-B as possible, so the effect of mistuning the video channel will not cause distortion of the low frequency portions of the video modulation, (low frequency "smearing"). The ideal response characteristic for the high frequency end of the band is a sharp cut-off at 4 megacycles, shown as curves A and B of Figure 187. While some receivers do approach this type of curve, most designs provide a more sloping cut-off such as shown by C and D of Figure 187.

While the reduction of high frequencies will result in the loss of some fine detail, when observing a stationary test pattern, this loss is not noticeable if motion occurs in the scene being televised and, in the interest of economy, it has been found possible to reduce the pass band to 3 megacycles without noticeable degradation of the picture.

Up to this point our discussion of the position in the television channel of the video and sound carriers, as well as the adjacent channel frequency, has been concerned with their position in the spectrum as transmitted R-F signals. Since the local, or beating, oscillator of the television receiver is positioned at a frequency higher than the signal, all of these frequencies will be inverted in position when they appear as intermediate frequencies in the detector output. Figure 188 shows, in chart form, the various channel frequencies, video and audio carriers, local oscillator frequencies and I-F frequencies, of a typical television receiver.

Figure 189 shows the overall video I-F response curve for the receiver employing the frequency compensations of Figure 188.. On this curve are shown not only the significant I-F frequencies of the desired channel, but also the position of adjacent channel frequencies which might interfere with the operation of the receiver. The curve is seen to be depressed at these points. This reduction in response is accomplished by means of "trap" circuits.

Channel Number	Channel Freq. Mc	Video Modulated Carrier Freq. Mc	Audio Modulated Carrier Freq. Mc	Receiver Local Oscillator Freq. Mc	Video IF Freq. Mc	Audio IF Freq. Mc
2	54-60	55.25	59.75	81	25.75	21.25
3	60-66	61.25	65.75	87	25.75	21.25
4	66-72	67.25	71.75	93	25.75	21.25
5	76-82	77.25	81.75	103	25.75	21.25
6	82-88	83.25	87.75	109	25.75	21.25
7	174-180	175.25	179.75	201	25.75	21.25
8	180-186	181.25	185.75	207	25.75	21.25
9	186-192	187.25	191.75	213	25.75	21.25
10	192-198	193.25	197.75	219	25.75	21.25
11	198-204	199.25	203.75	225	25.75	21.25
12	204-210	205.25	209.75	231	25.75	21.25
13	210-216	211.25	215.75	237	25.75	21.25

Fig. 188. Chart of Typical Frequencies for the Local Oscillator and I-F Amplifiers of a Television Receiver.

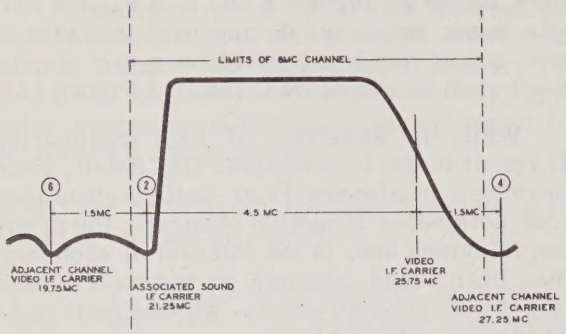

Fig. 189. Overall Video I-F Response Curve Showing Location of I-F Trap Frequencies.

This operation will be covered in the discussion of typical video I-F amplifier designs.

With regard to the choice of an intermediate frequency for television, it should be noted that a number of limitations are set by standards of the television system and frequency assignments. The I-F frequency chosen must lie between the highest video frequency component on the one side and the lowest television frequency channel assignment on the other. This means that television I-F frequencies cannot be lower than approximately 8 megacycles nor higher than 50 megacycles. Figure 190 lists the video and audio I-F frequencies which have been employed in commercial television receivers in the post-war period. The present design trend indicates that the higher frequencies may be chosen as the eventual standard for television receivers. Industry standardization committees are considering possible advantages of frequencies as high as 45.7 megacycles for video I-F, which would necessitate the use of 41.2 megacycles for the audio I-F.

Video IF Frequency Mc	Audio IF Frequency Mc
15.2	10.7
22.9	27.4
25.75	21.25
26.1	21.6
26.2	21.7
26.4	21.9
26.25	21.75
26.6	22.1
26.75	22.25
37.3	32.8

Fig. 190. Television Intermediate Amplifier Frequencies in Commercial Use.

METHODS OF OBTAINING WIDE BAND RESPONSE REQUIRED FOR VIDEO I-F. There are many types of coupling networks which can be used between the amplifier tubes of the video I-F amplifier to accomplish the wide band response required. Three major methods are currently used in receiver design. These are:

1. Over-coupled transformers with shunt resistance loading.

2. Staggered-tuned circuits.

3. Pairs of single-tuned circuits with overall negative feedback.

Of these systems, the second (or staggered-tuned circuit) is the most popular. The performance of the various types will be described and illustrated by typical examples later in this section. The circuits employed to reject undesired responses will be described separately from the coupled means used to assure a wide pass band.

Video I-F Amplifiers with Over-Coupled Tuned Transformers. If an interstage transformer with primary and secondary tuned to the same frequency has the coupling between the circuits progressively increased, a "double-humped" resonance curve will result after a point known as "critical coupling" has been passed. These double humps can be "smoothed" to a flat-top response curve by loading the primary and secondary circuits with the correct values of resistance. This of course results in lower Q and consequently lower gain than would be obtained with a narrower pass band. Figure 191 shows an intermediate frequency amplifier system using over-coupled transformers. The placement of parts of this system are shown in Figure 192.

The amplifier of Figure 192 makes use of three band-pass coupled stages employing type 6AU6 miniature tubes. Transformers L3-L4, L7-L8, L10-L11, and L12-L13 are over-coupled, and are then loaded with resistance in the secondary circuits to produce the flat-top band-pass characteristic. Although no primary shunt resistance is shown except in the case of coil L3, the plate-to-cathode resistance of the tubes provides the required primary loading. Broad tuning of the primary circuits is accomplished by the output capacitance of the stage and the associated wiring. No tuning adjustment is provided in the primary circuits with the exception of the last transformer (L12 - L13).

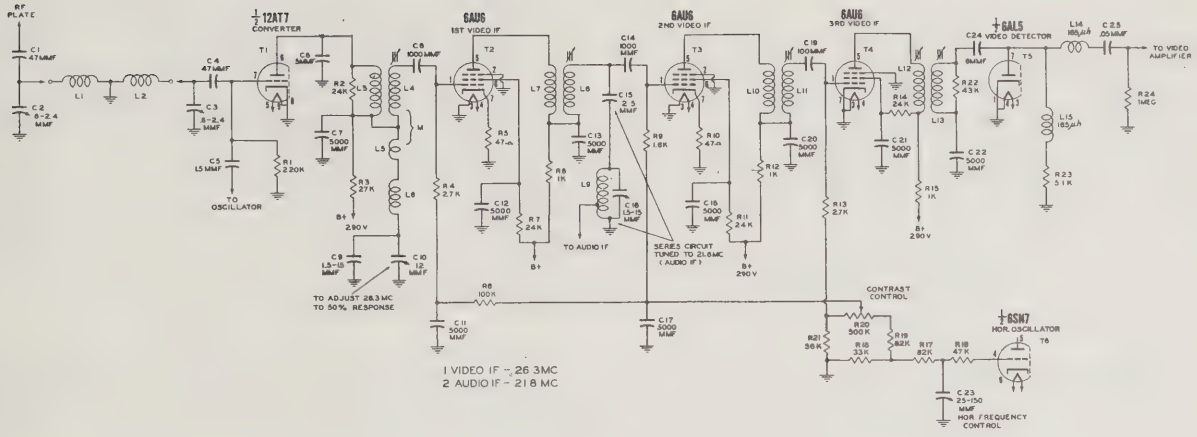

Fig. 191. Video I-F Amplifier Employing Over-Coupled Transformers.

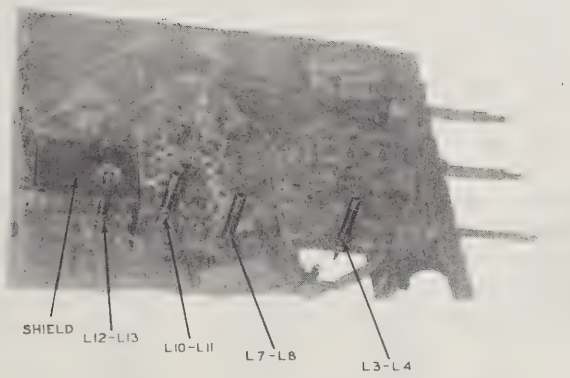

Fig. 192. I-F Amplifier Inductances of Figure 191. Photo from Sample Receiver Courtesy General Electric Company

Winding L5 of the input circuit of the amplifier tube T2 connects to a series-tuned trap, consisting of L5, L6 and capacitors C9 and C10 in parallel. This network is used to adjust the slope of the curve at the high frequency end of the I-F band. This is the section of the curve which is essentially double sideband (due to vestigial side-band modulation). (See pages 125 and 126.) While viewing the response curve on an oscilloscope, the television service technician can adjust capacitor C10 to place the 50% response point at the position of the video I-F carrier (26.3 megacycles in this particular receiver).

The series-tuned trap circuit, consisting of coupling capacitor C15 with tuned circuit elements L9 and C16, is adjusted to reduce or attenuate the sound carrier of the channel being tuned (21.8 megacycles). A tap on inductor L9 provides the audio intermediate frequency voltage for amplification by a second I-F amplifier system. At the frequency of series resonance of this circuit (21.8 megacycles), it effectively shunts the grid circuit by a low impedance, which puts a "notch" in the response curve of the amplifier.

Video I-F Amplifiers with Staggered-Tuned Circuits. Another solution to the problem of designing a video intermediate frequency amplifier to meet the requirements discussed, is that of coupling the tubes by single-tuned circuits which are tuned to different frequencies within the desired pass band.

If a number of single-tuned circuits (between amplifier tubes) are all tuned to the same frequency, the bandwidth decreases as stages are added, and the overall response grows more "peaked" or selective. However, if the tuning of the individual circuits are "staggered" about the center frequency, and the Q values of the circuits are adjusted by proper shunt resistor loading, the desired bandwidth can be obtained and a very satisfactory overall curve shape will result.

Curves B and C of Figure 193 illustrate the effects of the frequency of tune on the bandwidth of a pair of identical circuits (Figure 193A) as discussed above, first to the same frequency and then to frequencies separated from the center frequency by half of the bandwidth of the individual circuits. The bandwidth of a circuit is defined as the frequency "spread" between the points on the resonance curve at which the response is .7 of that at resonance.

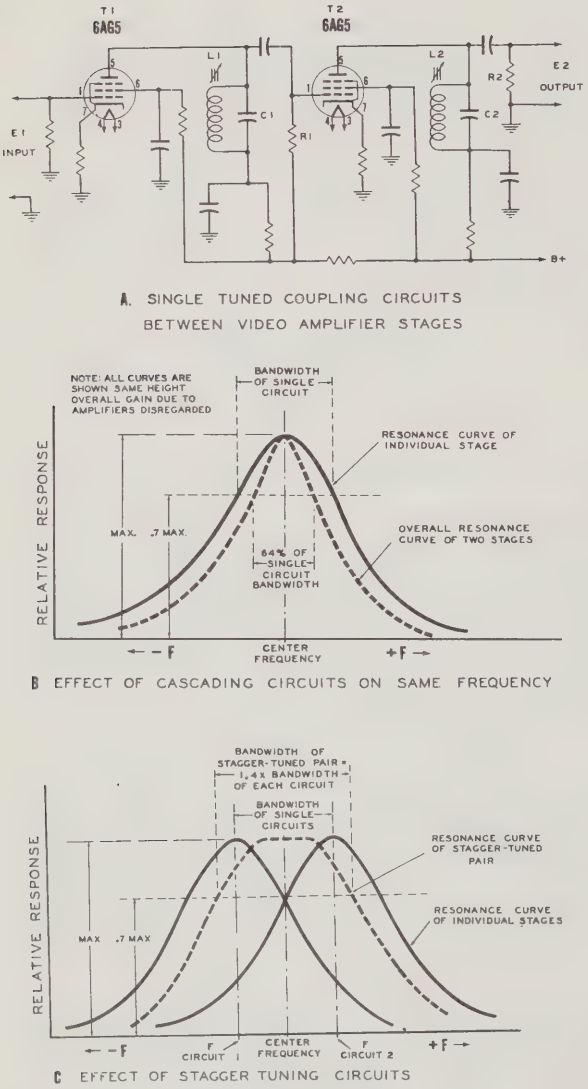

Fig. 193. (A) An I-F Amplifier Stage Employing Single Circuit Impedance Coupling. (B) Effect of Tuning the Circuits of Amplifier A to the same Frequency. (C) Effect of "Stagger-Tuning" the Frequencies of Amplifier A.

When both circuits are tuned to the same frequency as shown in Figure 193B, the overall bandwidth of the amplifier (Figure 193A) will be 64 percent of the bandwidth of the individual circuit. If, on the other hand, the tuning of the individual circuits is "staggered" above and below the center frequency as in Figure 193C, the overall bandwidth becomes 40% greater than that of the individual circuits.

While we have used the case of two circuits to explain the effects of stagger-tuning, the practical television video amplifier involves the staggering of more circuits to achieve the 4 to 6 megacycle bandwidth required. In the case of the two circuits just illustrated, the individual bandwidths and circuit Q values have been made identical for the sake of simplicity. In the actual circuits employed in television receivers, the circuit Q values are varied to produce resonance curve shapes and stage gains which will in turn cascade to produce the overall curve shape of Figure 189.

Figures 194, 195, 196 and 197 illustrate the details of a stagger-tuned video I-F amplifier system which is typical of many receiver designs in use.

Figure 194 shows the individual resonance curves of the various coupling circuits. Four stages of video I-F amplification are required to obtain sufficient I-F gain, and the necessary wide band characteristic. The effective Q of each circuit is determined by either the shunt plate resistance or a grid circuit resistor, so that the response curves produce the desired overall response shown by the dotted line of Figure 194. It will be noted that circuits 7 and 3 are high Q, circuits 5 and 6 of lower Q, and that circuit 9 of lowest Q is used to "fill" in the center of the curve.

In a stagger-tuned system variations of the individual amplifier tube gains do not affect the shape of the response curve and thus the amplifier is not unduly sensitive to tube interchange.

Figure 196 shows the various coupling units employed in this circuit identified by symbol numbers as to circuit position in the schematic of Figure 194. The converter plate unit (L1 - L2) and the coupling unit between the second and third stages (L8 - L9) are shown as used and also in disassembled form.

One of the advantages of the stagger-tuned amplifier is the fact that stability or freedom from a tendency to regenerate or oscillate is provided by the fact that grid and plate circuits of each amplifier tube are tuned to different frequencies. This makes it possible to construct the amplifier with a minimum of shielding. Figure 197 shows the corner of the chassis employing the circuit of Figure 194. It will be seen that the only shield employed is that surrounding circuit number 8. This circuit (sound trap for the accompanying sound I-F) is tuned to the same frequency as circuit 2

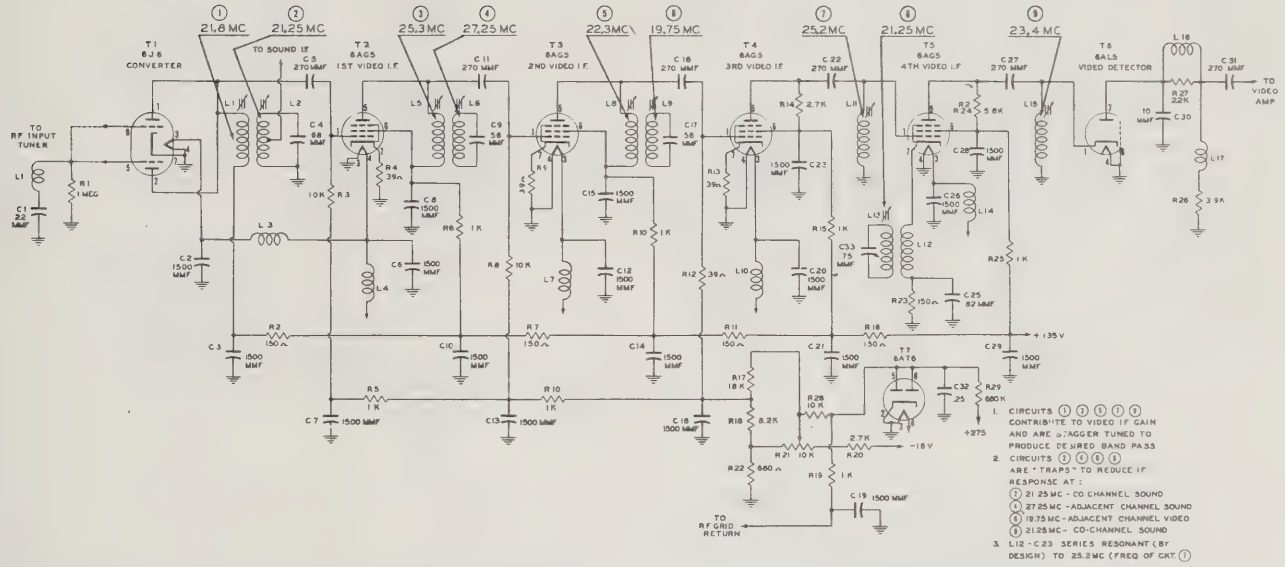
1 21.8 MC
2 21.25 MC
3 25.3 MC
4 27.25 MC
5 22.3 MC
6 19.75 MC
7 25.2 MC
8 21.25 MC
9 23.4 MC
T1 6J6 CONVERTER
T2 6AG5 1ST VIDEO I.F.
T3 6AG5 2ND VIDEO I.F.
T4 6AG5 3RD VIDEO I.F.
T5 6AG5 4TH VIDEO I.F.
T6 6AL5 VIDEO DETECTOR
T7 6AT6
TO RF INPUT TUNER
TO SOUND I.F.
TO VIDEO AMP
TO RF GRID RETURN
+135 V
+275
-18 V
1. CIRCUITS 1 2 3 5 7 9 CONTRIBUTE TO VIDEO I.F. GAIN AND ARE STAGGER TUNED TO PRODUCE DESIRED BAND PASS
2. CIRCUITS 2 4 6 8 ARE "TRAPS" TO REDUCE I.F. RESPONSE AT:
2 21.25 MC - CO CHANNEL SOUND
4 27.25 MC - ADJACENT CHANNEL SOUND
6 19.75 MC - ADJACENT CHANNEL VIDEO
8 21.25 MC - CO-CHANNEL SOUND
3. L12 - C23 SERIES RESONANT (BY DESIGN) TO 25.2 MC (FREQ OF CKT 7)

Fig. 194. An Example of a "Stagger-Tuned" Video I-F System.

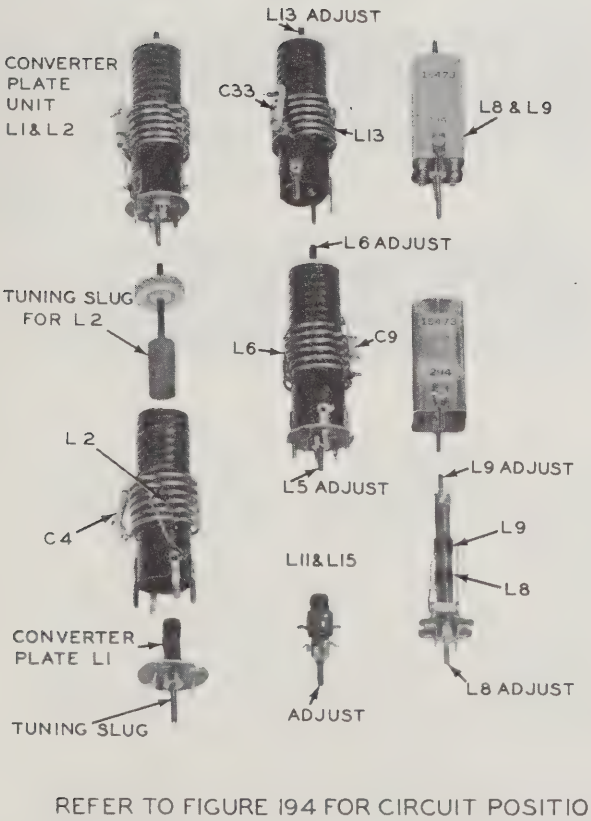

Fig. 196. Video Coupling Coils Used in the Video I-F Amplifier of Figure 195. Photo from Samples Courtesy F. W. Sickles Co.

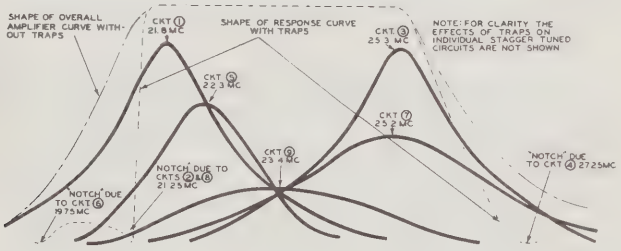
SHAPE OF OVERALL AMPLIFIER CURVE WITH-OUT TRAPS
SHAPE OF RESPONSE CURVE WITH TRAPS
NOTE: FOR CLARITY THE EFFECTS OF TRAPS ON INDIVIDUAL STAGGER TUNED CIRCUITS ARE NOT SHOWN
CKT 1 21.8 MC
CKT 5 22.3 MC
CKT 3 25.3 MC
CKT 7 25.2 MC
CKT 9 23.4 MC
"NOTCH" DUE TO CKTS 2 & 8 21.25 MC
"NOTCH" DUE TO CKT 6 19.75 MC
"NOTCH" DUE TO CKT 4 27.25 MC

Fig. 195. The Effect of Cascading the "Stagger-Tuned" Circuits of Figure 194.

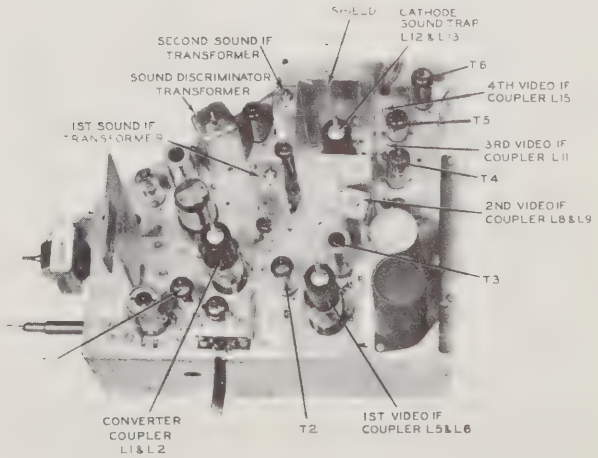

Fig. 197. Video and Audio I-F System of Figures 194, 195, and 196. Photo from Sample Receiver Courtesy R. C. A.

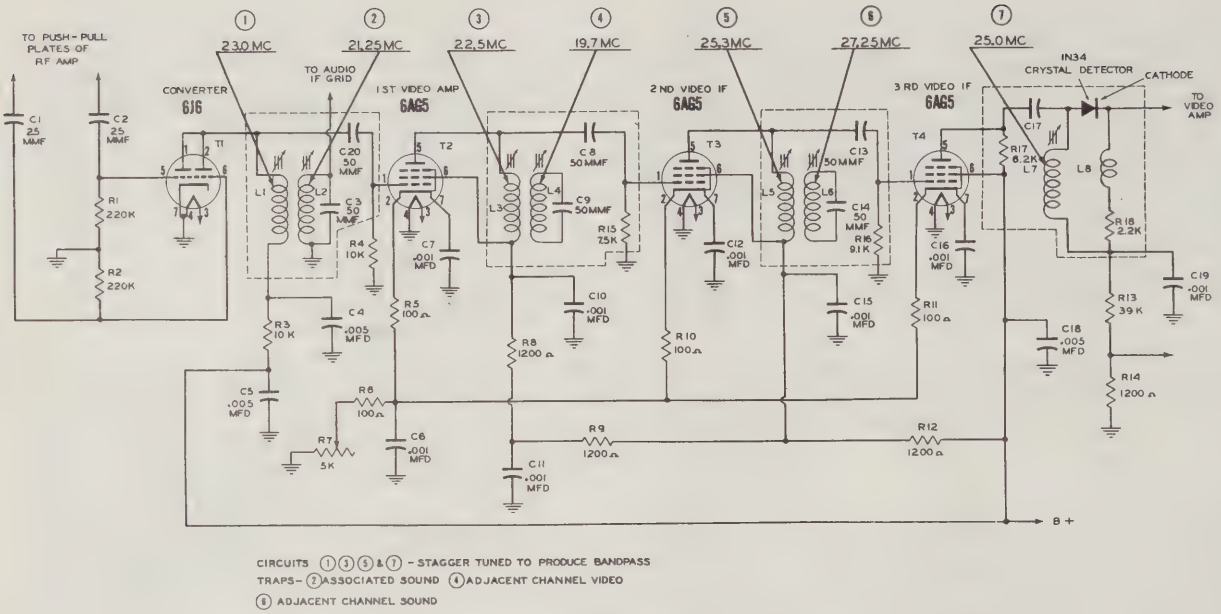

Fig. 198. Another Example of a "Stagger-Tuned" Video I-F Amplifier.

(L2 - C4). Overall oscillation by magnetic coupling would occur if it were not shielded.

Another important feature of stagger-tuning is the fact that alignment can be accomplished by a signal generator set to each of the individual circuit frequencies, while using a VTVM at the video detector for output indication. A sweep generator and oscilloscope are required for observation of the overall curve only.

The "trap" circuits, employed to reduce the response of the amplifier at the frequencies corresponding to the adjacent higher channel video carrier, the accompanying sound carrier, and the next lower adjacent channel sound carrier, have been indicated in Figure 194 and will be explained in detail later in this section.

Another example of a stagger-tuned video amplifier is shown in Figures 198, 199 and 200. In this case the entire video I-F amplifier, video detector, video amplifier and video output tube have been constructed as a strip sub-assembly. This unit is available for the assembly of television receivers by experimenters and students. Figure 198 shows the schematic wiring diagram of the unit which is illustrated photographically in Figures 198A and 198B. In this case the same principle of stagger-tuning is employed with the exception of the fact that different frequencies have been chosen to produce the required wide band

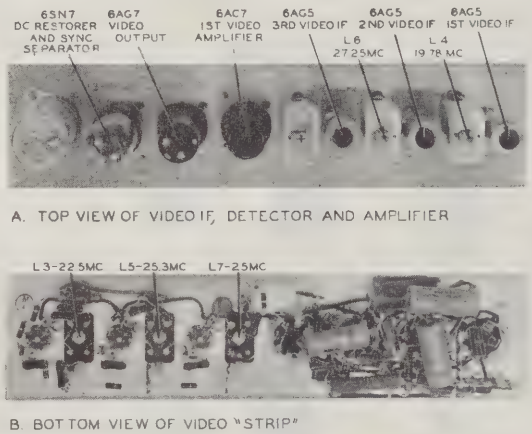
6SN7 DC RESTORER AND SYNC SEPARATOR
6AG7 VIDEO OUTPUT
6AC7 1ST VIDEO AMPLIFIER
6AG5 3RD VIDEO IF
6AG5 2ND VIDEO IF L6 27.25MC
6AG5 1ST VIDEO IF L4 19.78 MC
A. TOP VIEW OF VIDEO IF, DETECTOR AND AMPLIFIER
L3-22.5MC L5-25.3MC L7-25MC
B. BOTTOM VIEW OF VIDEO "STRIP"

Fig. 199. (A) Top View of Amplifier Shown in Figure 198. (B) Bottom View of Amplifier (Figure 198.) Photo from Sample Courtesy Meissner Mfg. Div., Maguire Industries, Inc.

curve. Absorption type traps are used to reduce the co-channel and adjacent channel interference. The coupling units are placed in individually shielded containers which make possible a very compact design. Figure 199B shows the bottom view of this assembly.

A unique feature of the design is the use of a germanium crystal as the video detector. It is housed within the shield compartment of the final coupling unit, L7. The details of construction of an interstage assembly (L5, L16, C13, C14, R16) and the output-detector

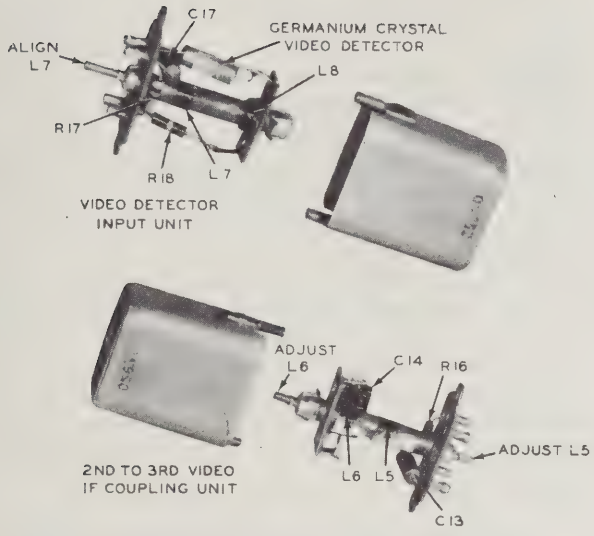

Fig. 200. Coupling Units Used in Amplifier (Figure 199). Photo from Sample Courtesy Meissner Mfg. Div., Maguire Industries, Inc.

stage R17, C17, L7, L8 and R18 are shown in Figure 200. The balance of the video system shown on the strip will be described when we consider in detail, the subject of the video amplification.

Wide Band Video I-F Amplification Employing Negative Feedback. Another method for obtaining wide band response with simplified alignment procedure is the use of negative feedback or degeneration around an amplifier stage comprised of input and output tuned circuits. Amplifiers of this type were employed in the intermediate frequency section of radar equipment during the war and are currently under consideration for television use. A four stage amplifier is shown in Figure 201. The coupling between tubes consists of a variable conductor (L1, L3, or L5) with the associated interelectrode tube and circuit capacitances. Resistors R3 and R15 connected from plate to grid of tubes T2 and T4 respectively, apply feedback voltage which results in broadening the bandwidth of the amplifier. An amplifier of this type can be aligned by disconnecting one end of each of the feedback resistors, and then tuning all of the circuits to the center frequency, taking into account the slight change of capacity caused by removal of the resistor (approximately .3mmf).

Since a change in the gain of the degenerated stage would result in a change of the bandwidth of the stage, it is possible to apply gain control to tubes R1 and T3 only. These tubes are not involved in the degeneration.

For simplicity, trap circuits for the reduction of undesired responses have not been included in this diagram.

REJECTION OF UNDESIRED ADJACENT CHANNEL AND CO-CHANNEL CARRIERS. In our consideration of the required response curve shape of the video I-F amplifier (see Figure 189) we have seen the necessity of reducing the response at the position which would be occupied by the sound carrier of the same channel being received, the video carrier of the next higher adjacent channel, and the sound carrier of the next lower adjacent channel. The production of low response points or

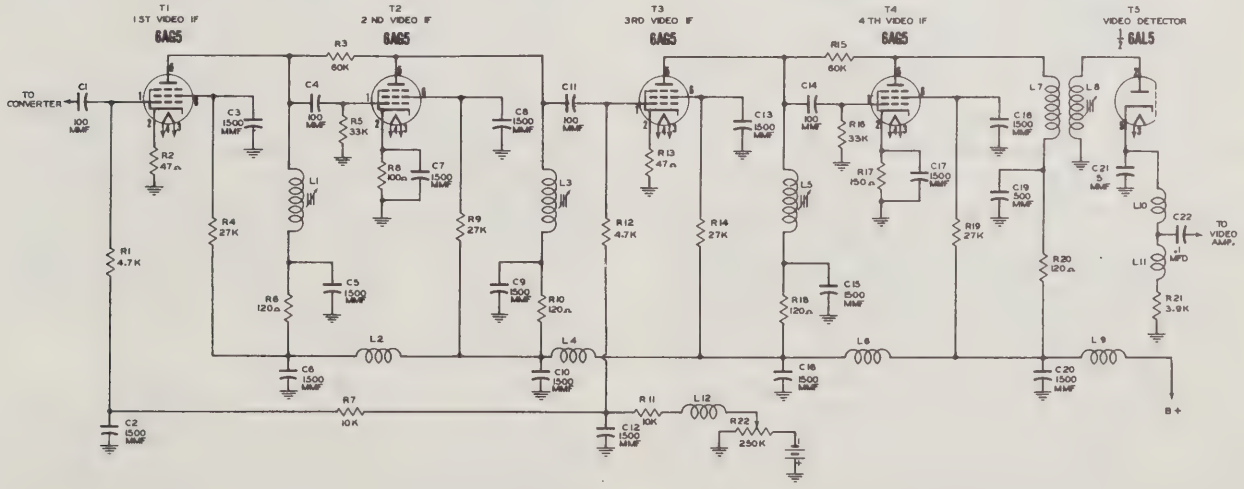

Fig. 201. A Video I-F Amplifier Employing Negative Feedback for Band Widening.

"notches" at the I-F frequencies corresponding to these carriers can be accomplished in the video amplifier by one or a combination of the following circuits:

1. Series-tuned circuit traps.
2. Parallel-tuned circuit "absorption" traps.
3. Cathode circuit or degenerative traps.
4. Bridged T networks as coupling elements and rejection circuits.

The trap circuits, items 1 and 2 (series and parallel tuned), are similar in function of operation to interference elimination traps which have been used in the radio service profession for the elimination of image interference or interference by strong local stations. The degenerative trap principle is often used in audio circuits for compensation, while the fourth or bridged T type of trap is similar in action to a null bridge, such as is employed for measurement purposes.

Series-Tuned Traps. The series-tuned trap is of the acceptance type and acts as a virtual short circuit across the system at its frequency of resonance. The impedance at this frequency is very low and is equal to the AC resistance of the circuit components. In the amplifier shown in Figure 191, the circuit comprising L5 and L6 in series, tuned by capacitors C9 and C10 in parallel, is used to adjust the slope of the high frequency end of the band pass curve. It permits the control of the point at which the video carrier falls (50% of maximum response for compensation of vestigial side-band effect). When this adjustment is made the curve falls off at a sufficient rate to reject the next lower channel sound carrier also. In this case the adjacent sound carrier falls at 27.8 megacycles. This series-tuned circuit is coupled to the secondary circuit (L4) by means of the coupling coil (L5).

In the grid circuit of the second video stage of this same amplifier (Figure 191) will be found another series-tuned trap. In this case, C15 and the parallel combination of L9 and C16, are tuned for maximum attenuation at 21.8 megacycles which is the associated or co-channel sound I-F carrier. It is necessary to reject this carrier from the video amplifier to prevent the production of "sound bands" on the picture. The trap serves the dual purpose of rejecting the sound channel and at the same time providing a resonant pick-off of the sound or audio I-F voltage for amplification through an audio I-F amplifier.

Shunt-Tuned or Absorption Type Traps. The absorption type trap is the most frequently used type of rejection circuit for undesired responses. Three traps of this type are shown in the schematic diagram of Figure 194 (circuits 2, 4 and 6). They consist of a parallel-tuned circuit coupled to the plate load of the video I-F stage. At the frequency of resonance of the circuit, a high circulating current is developed in the trap. The trap reacts through its inductive coupling in such a manner as to reduce the load impedance of the stage and greatly decrease the amplification at the point of tune. The effects of trap circuits 2, 4 and 6, of Figure 191, on the response curve of the amplifier are shown in the correspondingly numbered points on the overall amplifier curve of Figure 189.

Cathode Circuit or Degenerative Traps. Another method employed to reduce the amplifier gain at a particular point, is to use selective degeneration. This is done by placing a parallel resonant circuit in the cathode-to-ground circuit of one of the amplifier stages. This may be done either directly in the cathode circuit, or by coupling to it. At the resonant frequency of the trap, a high impedance appears in the circuit and the trap acts like a large un-bypassed resistor, causing degeneration and reducing the amplification of the stage to a very low value. The rejection figure of such a degenerative trap never can be greater than the gain of the stage, which in the case illustrated is approximately eight to one.

To prevent degeneration at the frequency of tune, or 25.2 megacycles, the primary coil L12 has been made broadly series-resonant at this frequency by means of tuning capacitor C25. This makes the cathode impedance low at 21.25 megacycles and prevents a loss in gain.

Figure 202 shows the use of a network of circuit elements known as the "bridged T". These circuits, for rejection of the undesired associated sound and adjacent sound I-F carriers, use a T shaped branch consisting of two capacitors and a resistor (C13, C14 - R12) and (C18, C19 - R19) "bridged" by an inductor (L5 and L13 respectively). The I-F amplifier shown in the photograph of Figure 203, uses the schematic of Figure 202.

The action of this arrangement is equivalent to a bridge circuit, but has the advantage that the input and output circuits can have a common terminal at ground potential.

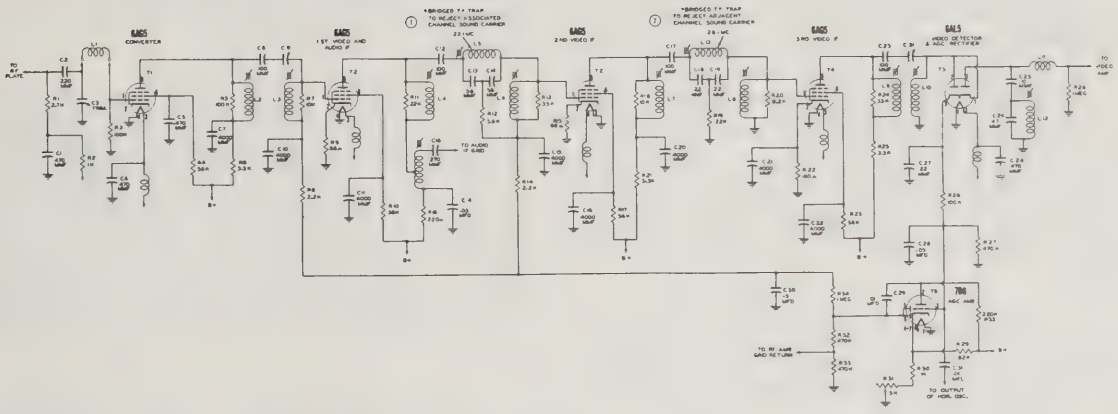

Fig. 202. A Video I-F System Using "Bridged T" Networks as Interference Traps.

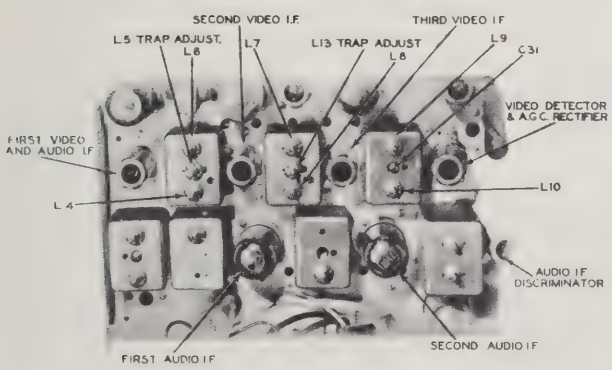

Fig. 203. Video I-F System Shown in Schematic (Figure 201). Photo from Sample Receiver Courtesy Philco Corporation.

The conditions of balance (for a null or low output) occur when the reactance of the variable inductance is made equal to the reactance of capacitors in series, and when the resistor in the center leg of the T is approximately one fourth of the parallel resistance of the tuned circuit. Another explanation of the circuit is that of an anti-resonant trap in the line with a secondary balance for the resistance losses of the circuit. Much sharper null "notches" and greater degree of rejection can be obtained by the use of the bridged T connection than with the trap circuit alone.

Over the video I-F band (22.6mc to 28mc in the example of Figure 202) trap circuit 1, which is tuned to a frequency lower than the band, acts as a capacitance coupling unit between the two stagger-tuned circuits, and circuit 2, tuned above the band, acts as an inductive coupling element.

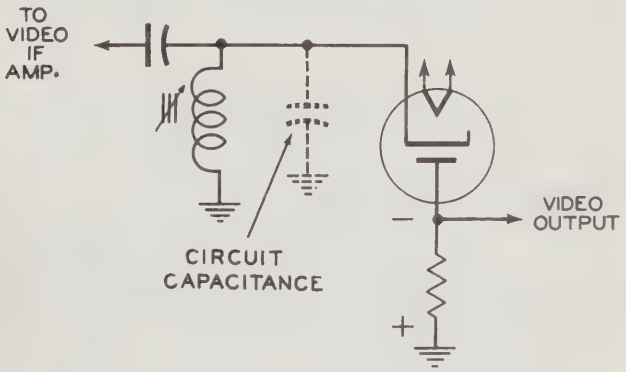
TO VIDEO IF AMP.
CIRCUIT CAPACITANCE
VIDEO OUTPUT
A. VIDEO OUTPUT INCREASES NEGATIVELY WITH RESPECT TO GND. AS CARRIER INCREASES.
TO VIDEO IF AMP.
CIRCUIT CAPACITANCE
VIDEO OUTPUT
B. VIDEO OUTPUT INCREASES POSITIVELY WITH RESPECT TO GND. AS CARRIER INCREASES.

Fig. 204. Diode Video Detector Output Polarity.

Another variation of the bridged T circuit (not illustrated) employs a center-tapped coil for the resistance branch and a single trimmer for the capacitance branch.

VIDEO DETECTORS. The video detector which follows the video I-F amplifier just discussed, is essentially the same type of demodulator as is used for the second detector of an A-M broadcast or short wave radio receiver. The only significant circuit differences between a video second detector and the familiar A-M second detector resides in the fact that the polarity of its output must be taken into consideration and compensation must be employed to prevent loss of the higher video frequencies.

Since the system of television broadcasting, in use in this country, is based on negative video modulation, the detector output must be of such polarity that an increase of carrier strength causes the video voltage at the picture tube control grid to become more negative and thus decrease the brilliance of the picture element.

If there are an even number of video amplifying stages between the detector and the picture tube grid, the output of the detector must be "negative going". In other words, an increase in I-F carrier strength, applied to the detector, results in a more negative video signal with respect to ground. Figure 204A shows a detector which supplies a negative picture polarity followed by two video stages.

If an odd number of stages are employed (in most instances this will be a single stage), a detector must be connected as shown in Figure 204B. This circuit, with the plate of the diode connected to the high side of the video coupling circuit, produces a video output across the load resistor which increases in positive polarity as the video carrier strength is increased.

A typical video detection and amplifying system which employs negative polarity video signal from the diode is shown in Figure 205. In this case the load resistor (R2) has a value of 3900 ohms, and has associated with it a group of circuit elements, C3, L3, L4, and R1, whose purpose is to assist in producing a flat video response characteristic over a range of from 30 cycles to more than 4 megacycles.

A significant difference between the operation of the diode as an A-M detector and as a video detector lies in the value of the load resistor. In the familiar broadcast application, a typical diode load varies from .5 to 2 megohms, and maintains this high load resistance over the range of frequencies required for sound reproduction. In most instances this involves frequencies no higher than 5000 cycles. In the video detection case, however, the capacitance of the diode and the capacitance to ground of its associated circuit prevent the use of a high diode load resistance, since it is necessary to provide flat response to at least 4 megacycles. At these high frequencies, the reactance of the circuit and tube capacitance would become lower than the load resistance, and thus by-pass the high frequencies. For this reason, the load resistance is made of the low value and the compensating elements just discussed produce a resonant rise of circuit impedance at the high end of the video band.

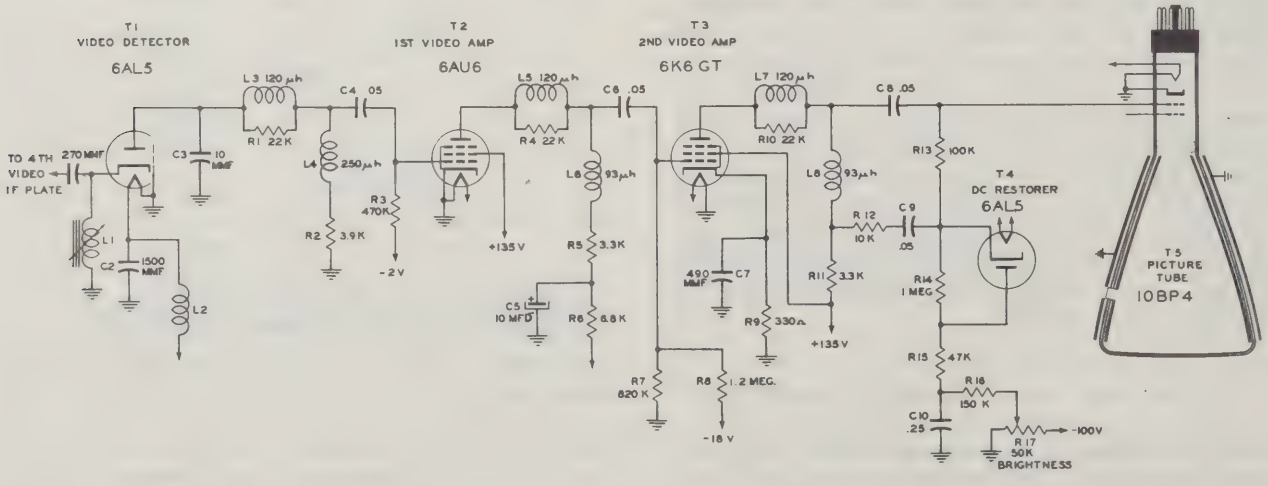

Fig. 205. Video Detector of Negative Polarity Feeding Picture Tube Grid through Two Video Stages.

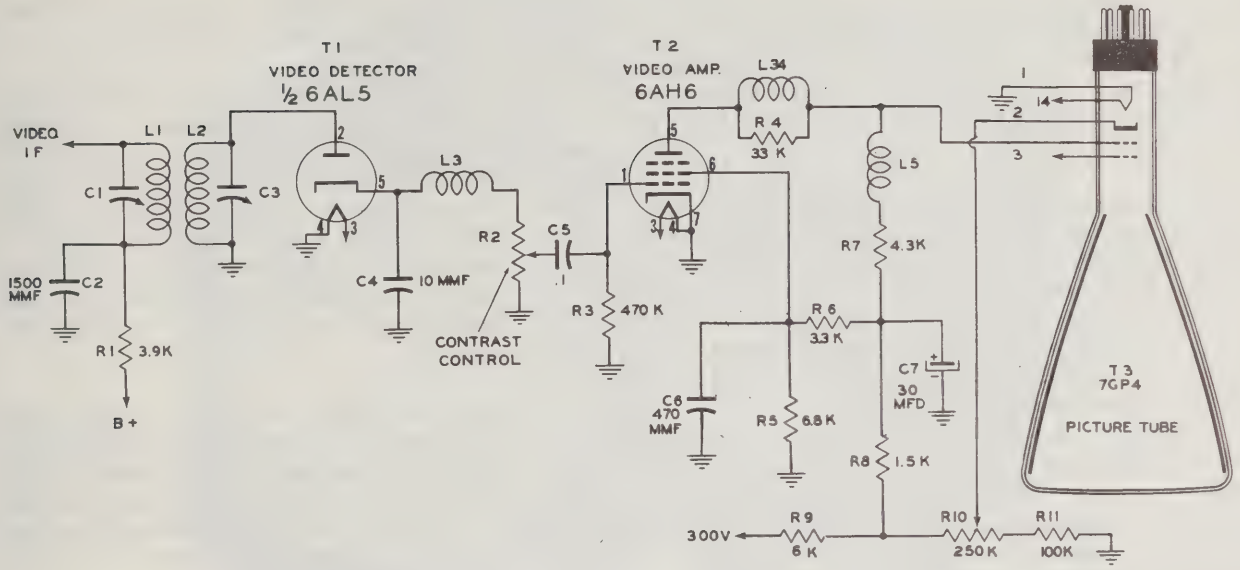

Fig. 206. Video Detector of Positive Polarity Feeding Picture Tube Grid through a Single Video Stage.

L3 is called a series-peaking choke, and L4 a shunt-peaking choke. These compensating elements are employed in each video stage (L5 - L6, L7 - L8, of Figure 205). A more complete discussion of their function will be presented when the subject of video amplification is considered.

Figure 206 shows a video detection and amplification system which employs the diode with its plate connected to the high side of the I-F input circuit in order to produce a "positive-going" video signal. In this case a single video amplifier stage is used, inverting the polarity, thus producing a more negative voltage at the picture tube control grid as the carrier strength increases. A combination of L3 and C4, together with the circuit capacitances, resonates at the high end of the video band and maintains a flat response from the

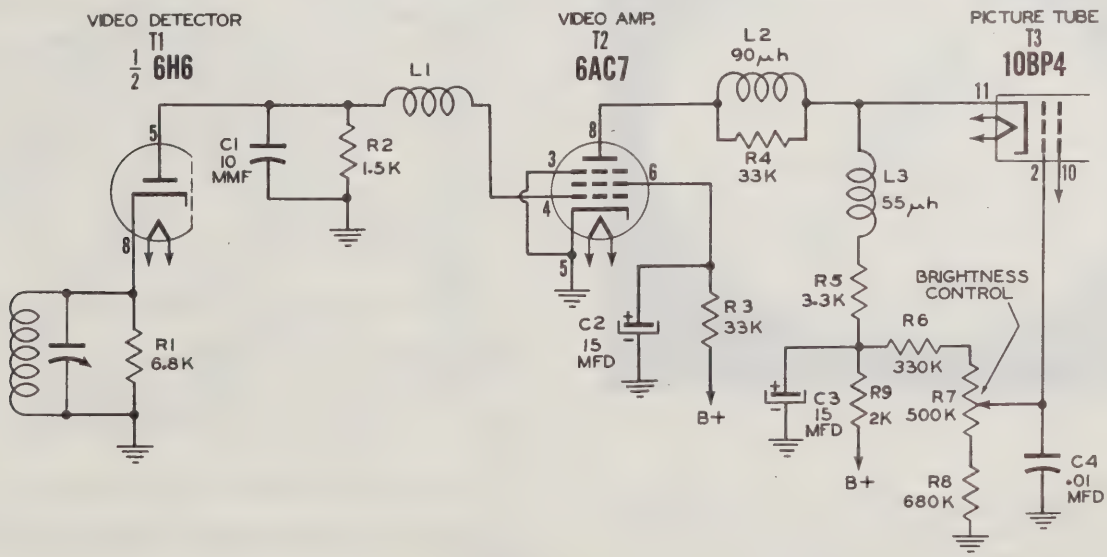

Fig. 207. A Positive Output Detector Feeding the Cathode of the Picture Tube through a DC Amplifier.

detector. Choke L3 also serves to reduce the 4.5 megacycle beat which occurs due to the associated sound I-F carrier beating with the video carrier. The presence of this 4.5 megacycle video interference would reduce the fine detail of the picture.

In the foregoing discussion, as illustrated by the circuits of Figures 205 and 206, the video output tube is coupled to the control grid of the picture tube. In certain television designs, for reasons of circuit simplification, the input to the picture tube is inverted and the plate of the video output tube is coupled to the cathode rather than to the control grid. When this is done, in order to turn over the signal at the picture tube input, it is necessary to reverse the rule previously stated and employ a positive rather than a negative-going signal for an even number of video stages. Figure 207 shows an example of such a circuit which employs the negative output detector (T1) with a single stage amplifier (T2) feeding the cathode of the picture tube (T3). A novel feature of this circuit, to be discussed in greater detail later, is the fact that the output of the detector is "direct-coupled" through the entire video amplifier to the picture tube. No coupling or blocking capacitors are employed and the diode (T1) therefore can fulfill the dual roles of detection and DC re-insertion.

THE GERMANIUM CRYSTAL DIODE AS A VIDEO DETECTOR. The small, cartridge-type, fixed crystal rectifiers (see Figure 208) which were developed during World War II for radar converters are finding applications in television design as a substitute for a thermionic diode. The germanium type (1N34) is being employed not only as a video detector but also as a DC restorer or DC re-insertion diode.

Figure 209 shows two typical applications of crystal detectors as video demodulators. Figure 209A shows a load circuit, consisting of resistor R5 and high frequency compensation network C4, L2, L3 and R4, connected in series with the diode. Figure 209B shows a shunt connection of similar elements.

Several features of the germanium crystal diode recommend its use as compared with the vacuum tube type. These are: lower capacitance, smaller size, lower dynamic resistance, reduction of power consumption (no heater required) and ease of mounting (no socket required). The lower capacitance and materially lower dynamic resistance result in improved performance as a video detector by providing higher rectification efficiency for a given bandwidth. Its improved linearity at low signal levels helps preserve highlight detail in the picture.

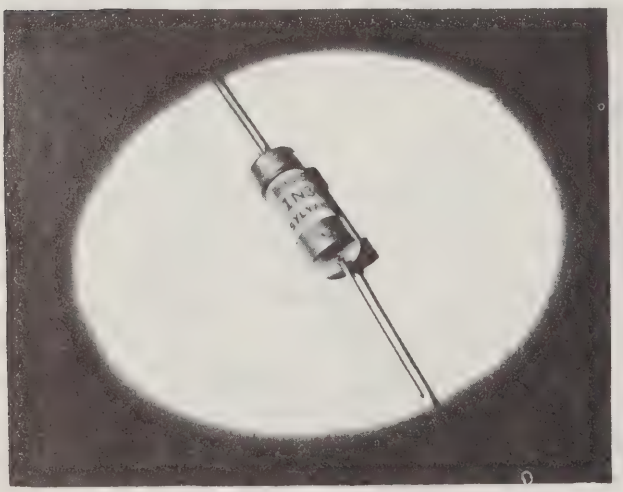

Fig. 208. Germanium Diode (1/4 inch diameter by 11/16 inch long). Photo from Sample Courtesy Sylvania Electric Products, Inc.

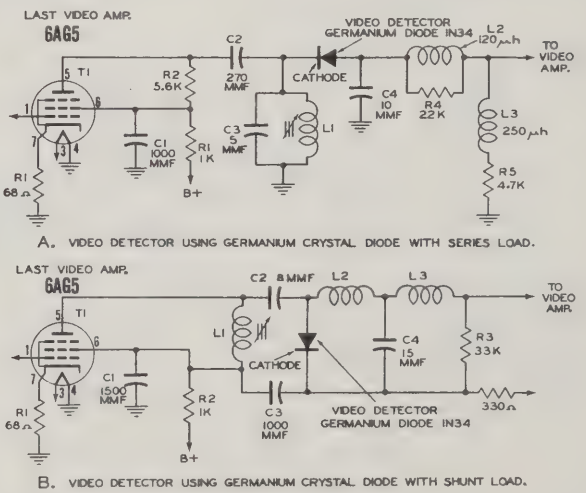

Fig. 209. The Germanium Crystal as a Video Detector.

Installment 15 will cover audio I-F amplification, audio I-F detection, video amplification, DC restoration, automatic gain control, contrast control, and inter-carrier sound systems.

AIRCASTLE MODEL 5029
BATTERY OPERATED

AIRCASTLE MODEL 5029
BATTERY OPERATED

AIRCASTLE MODEL 5029

TRADE NAME	Aircastle Model 5029
SUPPLIER	Spiegel Inc., 1061 W.35th St., Chicago, Ill.
TYPE SET	Battery Operated Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 1R5 Converter, 1U4 IF Amp., 1S5 Det.-AVC-AF, 3S4 or 3V4 Power Output
POWER SUPPLY	1.5 Volts "A" Supply and 67.5 Volts "B" Supply
RATING	225MA @ 1.5 Volts DC and 13.2MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

In Step 3 the chassis and batteries must be in their normal position in the cabinet to reflect the proper loop impedance.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to rear stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2	.1 MFD.	"	1400KC	1400KC	"	A5	Adjust for maximum output. Reassemble receiver in cabinet
3		Wrap one turn of high side of sig. gen. lead around outside of cab.	"	Tune for maximum output.		A6	Remove button plug from end of cabinet and adjust A6 for maximum volume.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1U4	1U4	6AR	
3	Det.-AVC-AF	1S5	1S5	6AU	
4A	Power Output	3S4	3S4	7BA	
B	" "	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRCASTLE PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
5	10	75		M-10-150	UT-121	PRSA150-12	BR1215	Filter*
6	.005	600	PC-6	S-6-005	TC-25	684-005	DT6D5	Output Plate Bypass
7	.005	600	PC-6	S-6-005	TC-25	684-005	DT6D5	Audio Coupling
8	.01	400	PC-7	S-4-01	TC-11	484-01	DT4S1	AF Screen Bypass
9	.005	600	PC-6	S-6-005	TC-25	684-005	DT6D5	Audio Coupling
10	.01	400	PC-7	S-4-01	TC-11	484-01	DT4S1	AVC Filter
11	.01	400	PC-7	S-4-01	TC-11	484-01	DT4S1	Conv. Screen Bypass
12	100		MC-2	MO.5-31	1FM-31	1468-0001	5W5T1	AF Plate Bypass
13	100		MC-2	MO.5-31	1FM-31	1468-0001	5W5T1	Diode RF Filter
14	100		MC-2	MO.5-31	1FM-31	1468-0001	5W5T1	Osc. Grid Cap.

*May use part #EC-7, 20 MFD. @ 80 volts.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
15	1 Meg.	½	VC-8			Volume Control & Sw.

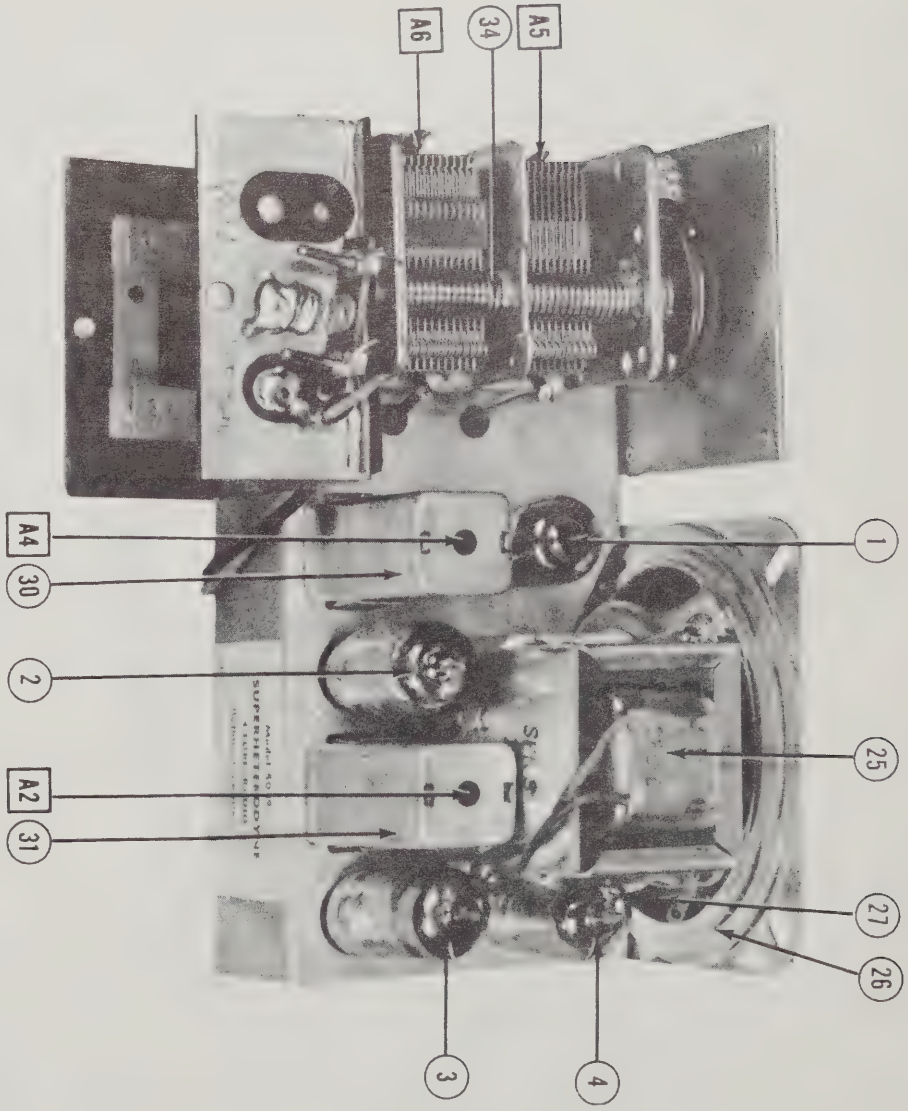
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	IRC PART No.	IDENTIFICATION CODES
16	220KΩ	½	1R-20	BTS-220K	Red-Red-Yl. Oscillator Grid
17	3.3 Meg.	½	1R-23	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
18	10KΩ	½	1R-37	BTS-10K	Br.-Blk.-Or. Converter Screen Decoupling
19	82KΩ	½	1R-31	BTS-82K	Gray-Red-Or. Diode RF Filter
20	10 Meg.	½	1R-3	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
21	3.3 Meg.	½	1R-23	BTS-3.3 Meg.	Or.-Or.-Grn. AF Screen Dropping
22	1 Meg.	½	1R-12	BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
23	2.2 Meg.	½	1R-13	BTS-2.2 Meg.	Red-Red-Grn. Output Grid
24	620Ω	½	1R-39	BTS-680	Blue-Red-Br. Bias

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: AIRCASTLE PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.	INSTALLATION NOTES
25	3700Ω	3.2Ω	410Ω	.7Ω	Part of SPK-8	A-3876†	T22S46†	A-2900†	†Bend mounting tabs down, file out slots and mount on original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: AIRCASTLE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.				
26	PM	3.2Ω	6PK-8			
	CONE DIA.	VC DIA.				
27	3-7/16"	9/16"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT			

R F COILS

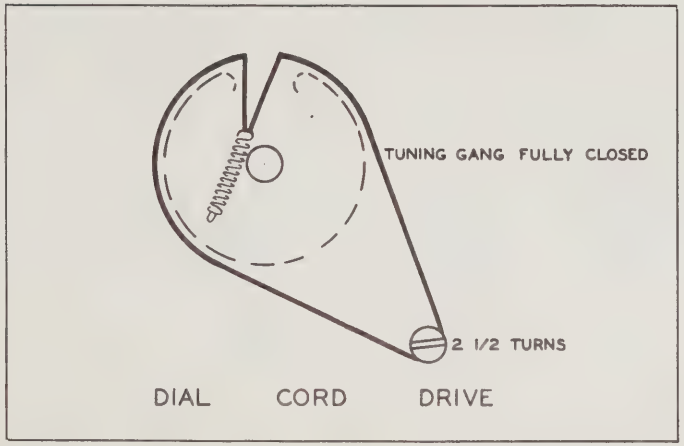
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: AIRCASTLE PART No.	MEISSNER PART No.
28	Loop Ant.		1.3Ω	LL13	
29	Osc. Coil	1.2Ω	7.2Ω	LO12	
30	Input IF	22Ω	22Ω	LI5	16-6668
31	Output IF	22Ω	22Ω	LI5	16-6669

BATTERIES

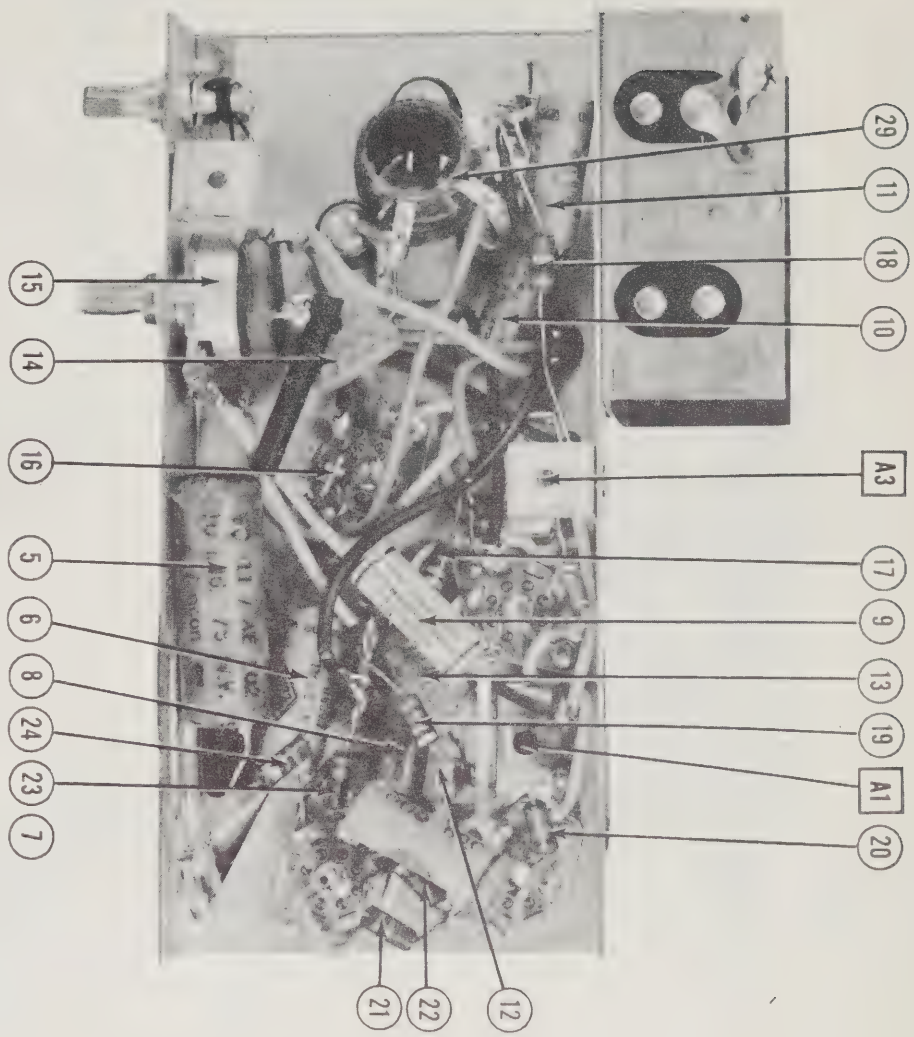
ITEM No.	VOLTAGE	AIRCASTLE PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
32	1.5V "A"		#950			2R			2 Used in Parallel
33	67.5V"B"			#467			XX45		

MISCELLANEOUS

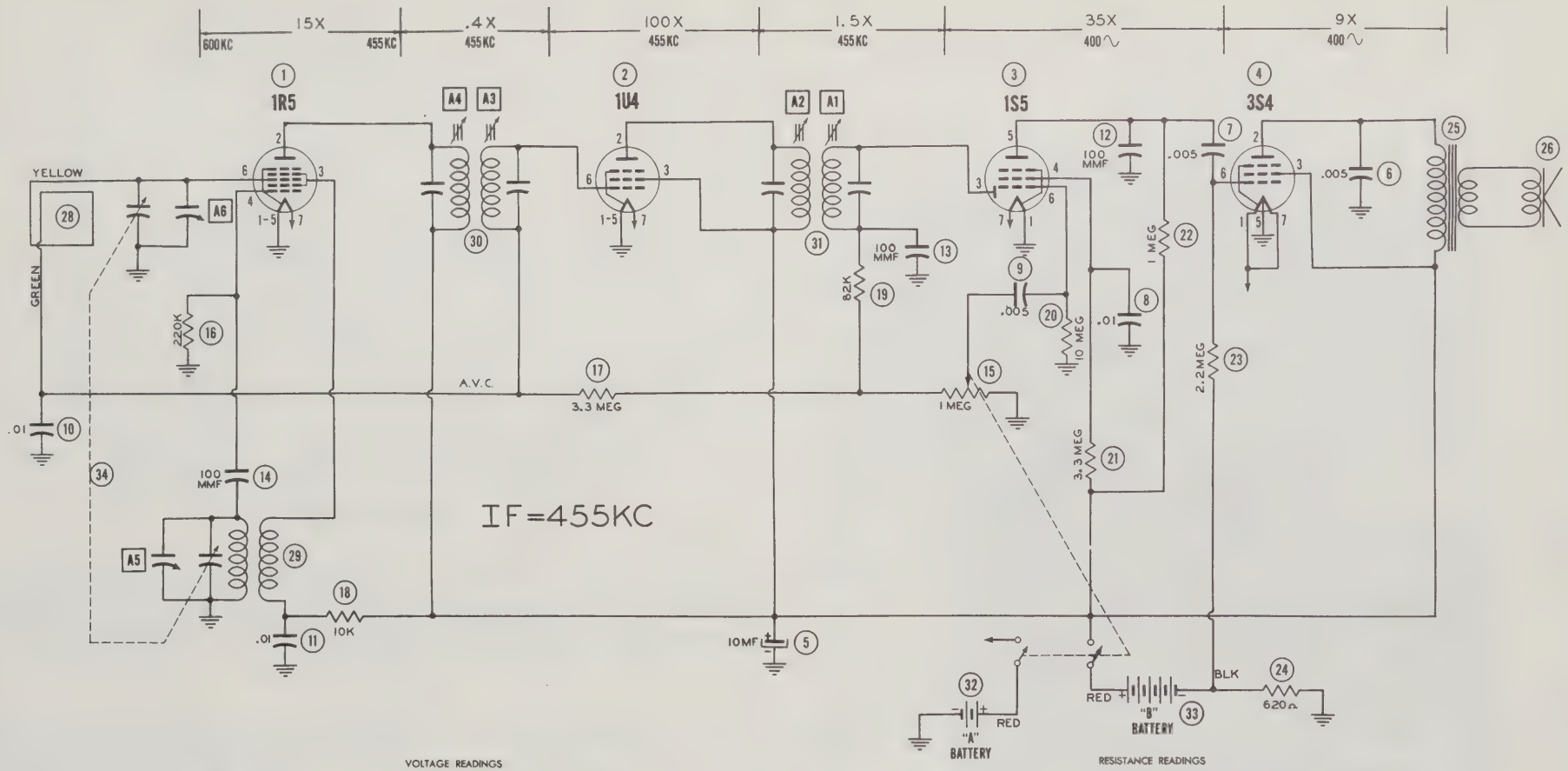
ITEM No.	PART NAME	AIRCASTLE PART No.	NOTES
34	2 Gang Var. Cap	GC-4	(50-216 MMF, 37-468 MMF)
A6	Trimmer	TC-7	Ant. Adj.



CHASSIS—BOTTOM VIEW



AIRCASTLE MODEL 5029



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	0V.	64VDC	49VDC	10.5VDC§	0V.	0V.	1.4VDC
2	1U4	0V.	64VDC	64VDC	0V.	0V.	0V.	1.4VDC
3	1S5	0V.	0V.	-.1VDC	13.9VDC	10VDC	0V.	1.4VDC
4	3S4	1.4VDC	62VDC	-.4VDC	64VDC	0V.	62VDC	1.4VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	*	55KΩ	65KΩ	180KΩ	*	4 Meg.	*
2	1U4	*	55KΩ	55KΩ	4 Meg.	*	4 Meg.	*
3	1S5	*	INF.	1 Meg.	3.5 Meg.	1 Meg.	10 Meg.	*
4	3S4	*	55KΩ	2.2 Meg.	55KΩ	*	55KΩ	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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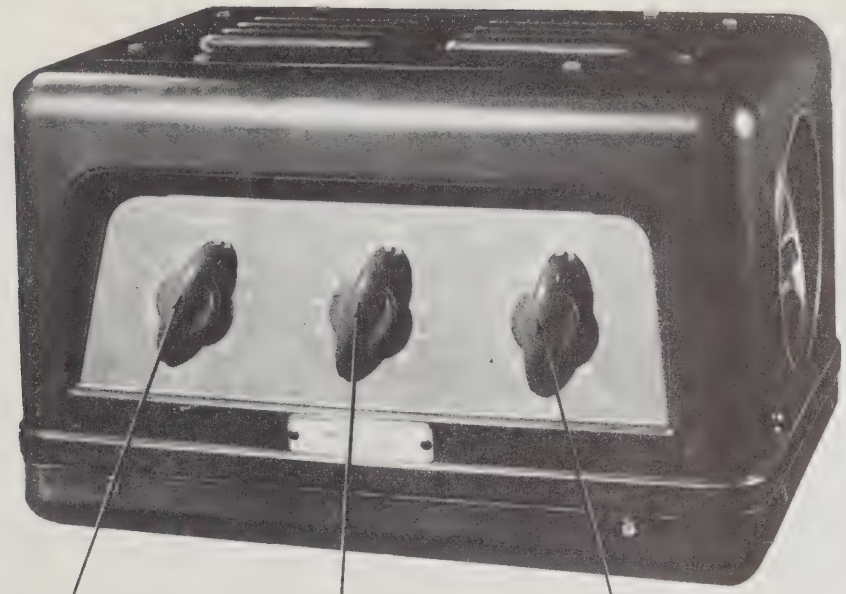
4821-1

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC to chassis.

1 - DC Voltage measurements are at 20,000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.



AIRLINE
MODEL 64BR-7000A

AIRLINE MODEL 64BR-7000A

TRADE NAME	Airline, Model 64BR-7000A
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Ill.
TYPE SET	AC Operated 2 Channel Audio Amplifier
TUBES (FIVE)	Types, 6SQ7 Mic. Amp., 6SL7GT Mixer-Phase Inverter, (2) 6V6GT Power Output, 5Y3GT Rectifier.
POWER SUPPLY	105-125 Volts AC RATING .52 Amp. @ 117 Volts AC

AIRLINE
MODEL 64BR-7000A

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SQ7	0V.	-.4VDC	0V.	0V.	0V.	75VDC	4.1VAC	1.4VAC
2	6SL7GT	0V.	75VDC	1.2VDC	0V.	80VDC	1.2VDC	1.4VAC	4.1VAC
3	6V6GT	0V.	4.1VAC	290VDC	285VDC	0V.	0V.	1.4VAC	17.5VDC
4	6V6GT	0V.	4.1VAC	290VDC	285VDC	0V.	0V.	1.4VAC	17.5VDC
5	5Y3GT	0V.	300VDC	0V.	285VAC	0V.	285VAC	0V.	300VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SQ7	0Ω	2.2 Meg.	0Ω	0Ω	0Ω	590KΩ	40Ω	40Ω
2	6SL7GT	10KΩ	590KΩ	2.2KΩ	560KΩ	590KΩ	2.2KΩ	40Ω	40Ω
3	6V6GT	0Ω	40Ω	80KΩ	82KΩ	480KΩ	480KΩ	40Ω	210Ω
4	6V6GT	0Ω	40Ω	80KΩ	82KΩ	470KΩ	540KΩ	40Ω	240Ω
5	5Y3GT	INF.	80KΩ	0Ω	95Ω	INF.	88Ω	0Ω	80KΩ

NOTE: FILAMENT VOLTAGE MEASURES 6.4VAC ACROSS FILAMENT PINS.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connection are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, no signal applied for voltage measurements.

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DATE 12/48-#4821-2 SET #51-FOLDER #2

PARTS LIST AND DESCRIPTIONS

AIRLINE MODEL 64BR-7000A

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Mic. Amp.	6SQ7	6SQ7	9Q	
2	Mixer-Phase Inv.	6SL7GT	6SL7GT	8BD	
3	Power Output	6V6GT	6V6GT	7AC	
4	" "	6V6GT	6V6GT	7AC	
5	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	15	400	BEB-8C-11796	AF444J4A	UP22245C	DY-404	EL-442	● Filter
B	15	400						■ " "
C	10	300						▲ Decoupling
D	20	25						Output Cathode Bypass
7	.001	600	BEC-8D-10929	684-001	GT6D1	ST-6-001	TC-21	Tone Compensation
8	.05	400	BEC-8D-10813	484-05	GT4S5	ST-4-05	TC-15	Audio Coupling
9	.05	400	BEC-8D-10813	484-05	GT4S5	ST-4-05	TC-15	" "
10	.05	400	BEC-8D-10813	484-05	GT4S5	ST-4-05	TC-15	" "
11	.05	400	BEC-8D-10813	484-05	GT4S5	ST-4-05	TC-15	" "

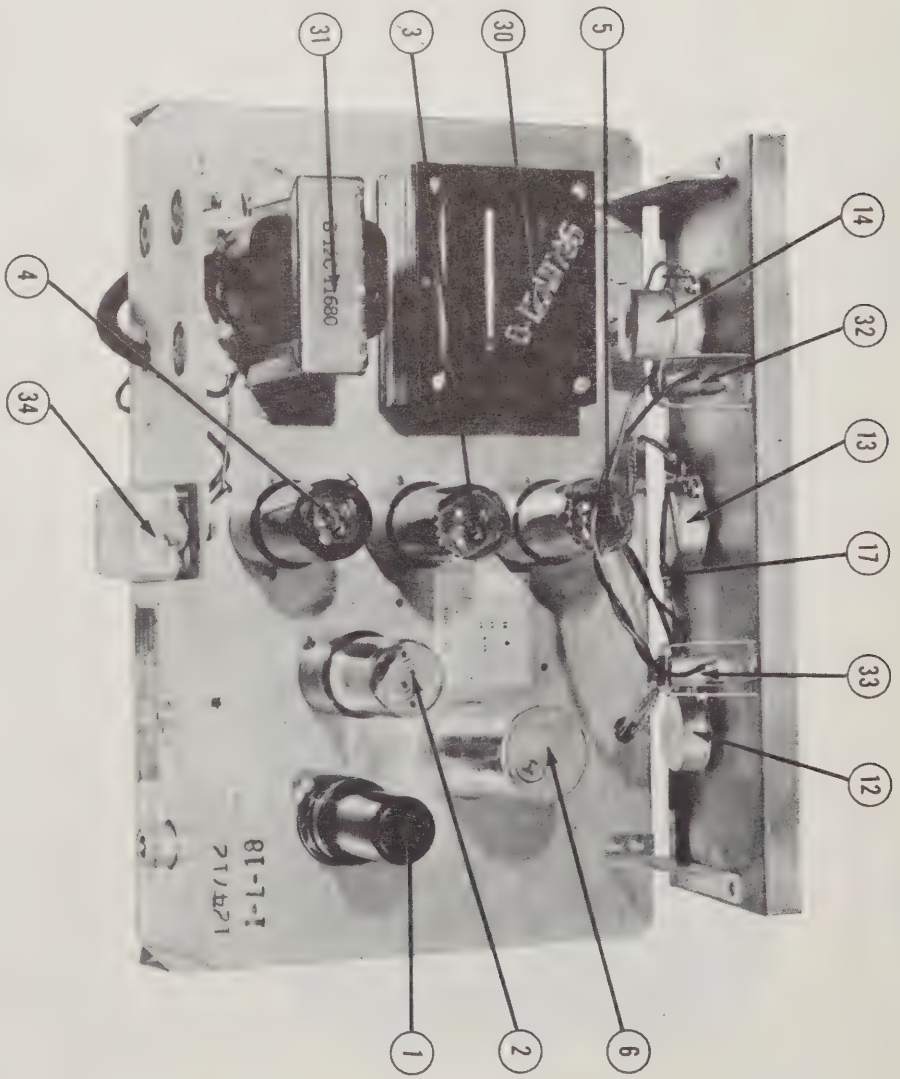
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
12A	1 Meg.	½	BEA-10B-10846	D13-137	M-63-Z	Mike Control
B	Shaft		Not Req.	A	Not Req.	Attach to 12A per instructions
13A	1 Meg.	½	BEA-10B-10846	D13-137	M-63-Z	Phono Control
B	Shaft		Not Req.	A	Not Req.	Attach to 13A per instructions
14A	1 Meg.	½	BEA-11B-10845	D11-137	M-61-S	Tone Control
B	Shaft		Not Req.	A	Not Req.	Attach to 14A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
15	2.2 Meg.	½	BEC-9B1-102	BTS-2.2 Meg.	Red-Red-Grn. Mic. Amp. Grid
16	470KΩ	½	BEC-9B1-94	BTS-470K	Yl.-Vi.-Yl. Mic. Amp. Plate Load
17	560KΩ	½	BEC-9B1-95	BTS-560K	Grn.-Blue-Yl. Isolation
18	56KΩ	½	BEC-9B1-83	BTS-56K	Grn.-Blue-Or. "
19	2200Ω	½	BEC-9B1-66	BTS-2200	Red-Red-Red AF Cathode
20	470KΩ	½	BEC-9B1-94	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
21	470KΩ	½	BEC-9B1-94	BTS-470K	Yl.-Vi.-Yl. Phase Inv. Plate Load
22	10KΩ	½	BEC-9B1-183	BTS-10K	Br.-Blk.-Or. Phase Inv. Grid
23	470KΩ	½	BEC-9B1-94	BTS-470K	Yl.-Vi.-Yl. Output Grid
24	470KΩ	½	BEC-9B1-94	BTS-470K	Yl.-Vi.-Yl. " "
25	220Ω	2	BEC-9B4-143	BW-2-220	Red-Red-Br. Output Cathode
26	56KΩ	½	BEC-9B1-83	BTS-56K	Grn.-Blue-Or. Decoupling
27	2200Ω	½	BEC-9B1-66	BTS-2200	Red-Red-Red Filter
28	130Ω	½	BEC-9B1-138	BW-½-120	Br.-Or.-Br. Hum Balance
29	56Ω	½	BEC-9B1-129	BW-½-56	Grn.-Blue-Blk. Hum Balance

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	AIRLINE PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
30	117V AC @ .52A	570V CT .072A DC	5.2V AC @ 2.0A	6.4V AC @ 1.8A	B-12A-11795	P-6312	T22R04	P-2952

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		AIRLINE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
31	7400Ω CT	8Ω/ 4Ω	176Ω CT	.3Ω/ .2Ω	B12C-11680	A-3880	T22S88#	A-2905	#Drill one new mounting hole.

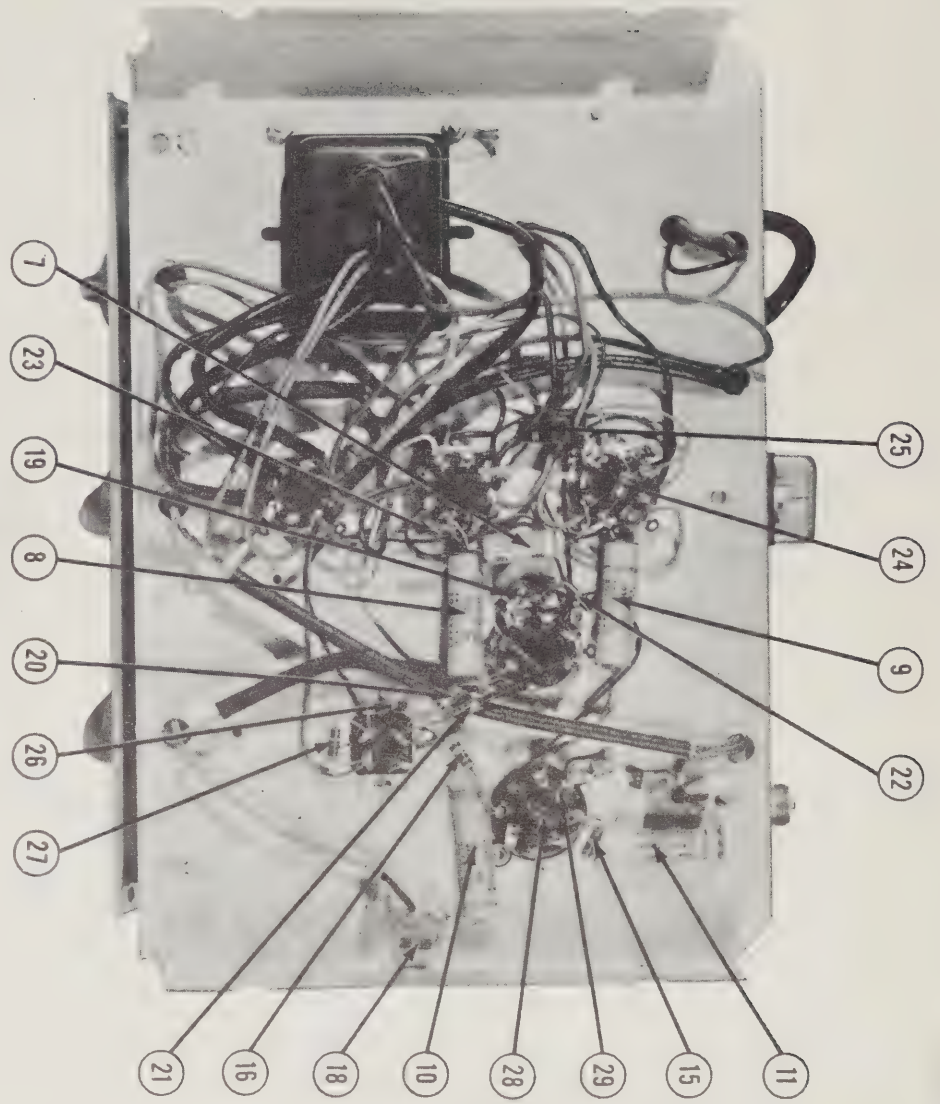
DIAL LIGHT

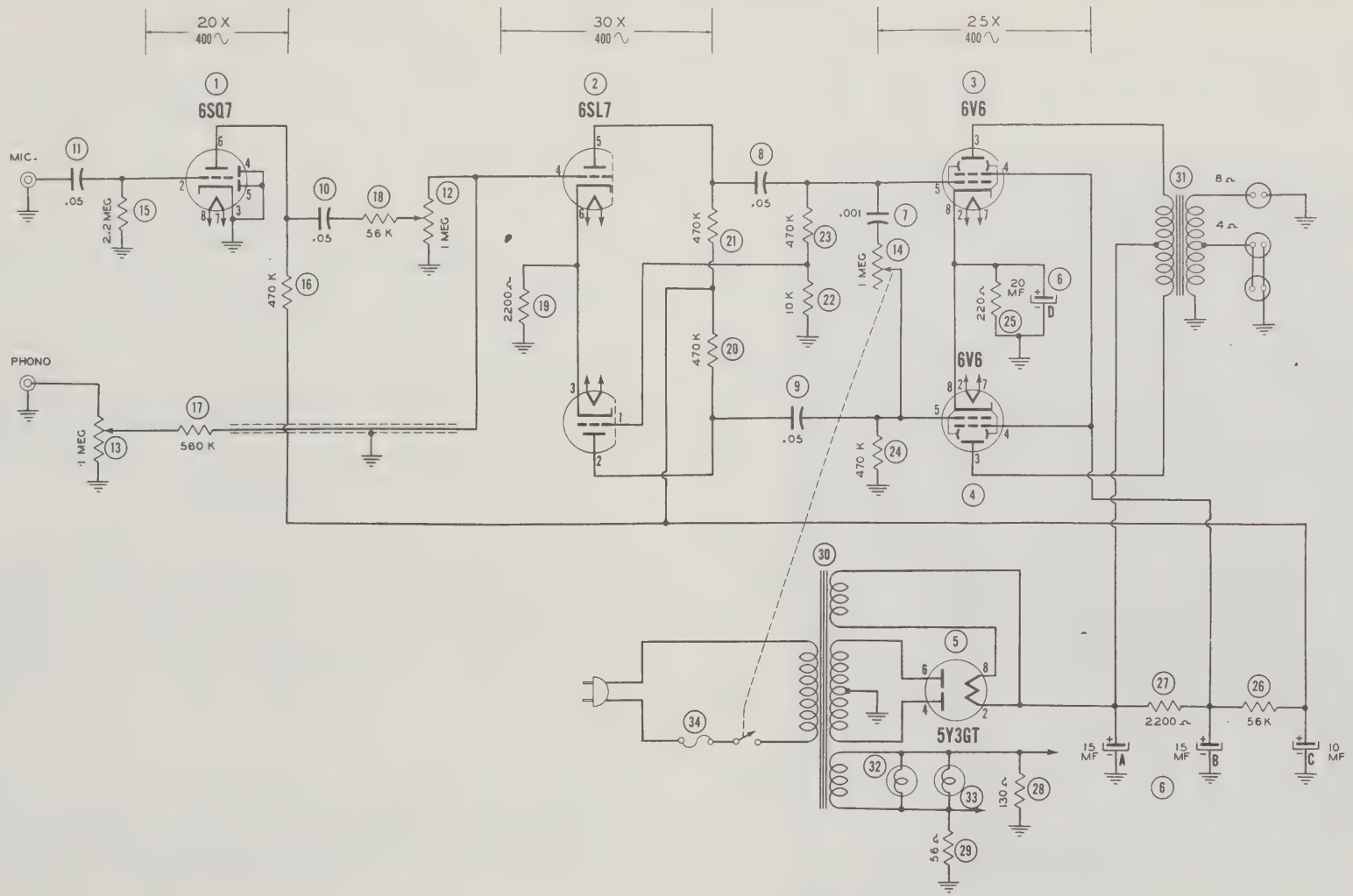
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA AIRLINE PART No.		INSTALLATION NOTES
32	Bayonet	6-8	0.15	Brown	BEB-46A-10793		Type 47
33	"	"	"	"	BEB-46A-10793		"

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
34	Fuse	BEA-46B-2717	2 Amp.
	Knob	BEA-5B-10848-52	
	Dial Plate	BEB-2C-10815-1	

CHASSIS—BOTTOM VIEW





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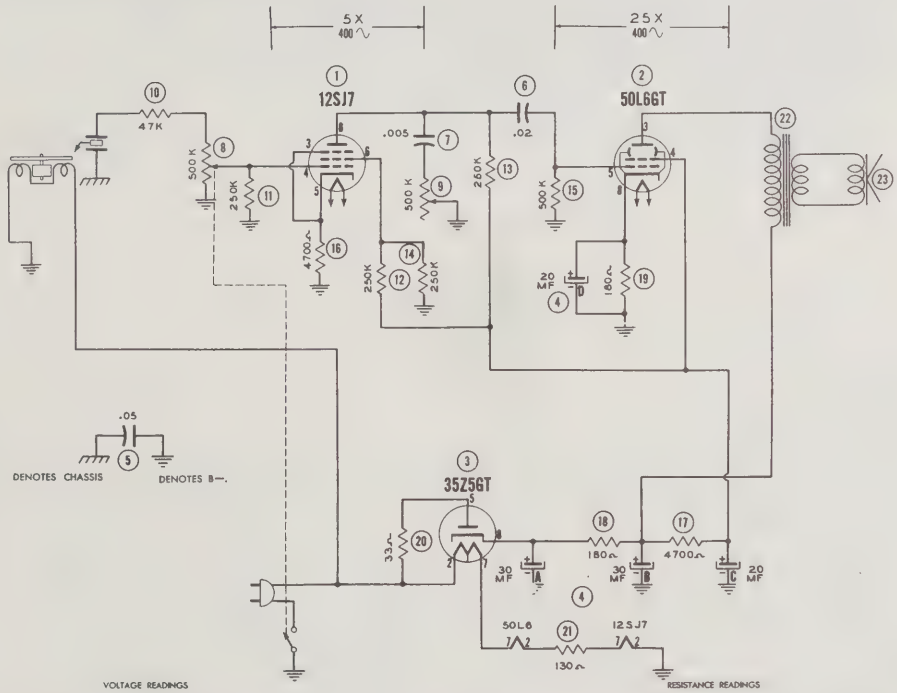
AIRLINE
MODEL 84GDC-963B

AIRLINE MODEL 84GDC-963B

TRADE NAME	Airline, Model 84GDC-963B
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Ill.
TYPE SET	AC Operated Phono Player with 3 Tube Amplifier
TUBES (THREE)	Types, 12SJ7 AF Amp., 50L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	110-120 Volts AC RATING .22 Amp. @ 117 Volts AC



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SJ7	0V.	0V.	2VDC	0V.	2VDC	37VDC	13VAC	16VDC
2	50L6GT	0V.	34VAC	115VDC	107VDC	0V.	0V.	85VAC	7.5VDC
3	35Z5GT	0V.	117VAC	107VAC	0V.	112VAC	0V.	85VAC	130VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SJ7	INF.	0Ω	4.7KΩ	200KΩ	4.7KΩ	170KΩ	13Ω	330KΩ
2	50L6GT	INF.	140Ω	70KΩ	75KΩ	500KΩ	240KΩ	180Ω	180Ω
3	35Z5GT	INF.	215Ω	205Ω	INF.	248Ω	INF.	180Ω	70KΩ

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4821-3

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum. no signal applied for voltage measurements.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	AF Amp.	12SJ7	12SJ7	8N	
2	Power Output	50L6GT	50L6GT	7AC	
3	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRLINE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
4A	30	150		AF886D4A	UP44315C	DY-401	EL-434	● Filter
B	30	150						■ "
C	20	150						▲ "
D	20	25						Output Cathode Bypass
5	.05	400		484-05	GT4S5	ST-4-05	TC-15	Line Isolation
6	.02	400		484-02	GT4S2	ST-4-02	TC-12	Audio Coupling
7	.005	600		684-005	GT6D5	ST-6-005	TC-25	Tone Compensation

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
8A	500KΩ	½		D13-133	M-60-Z	Volume Control
B	Shaft			A	Not Req.	Attach to 8A per instructions
C	Switch			41	SW-A	" " " " "
9A	500KΩ	½		D13-133	M-60-Z	Tone Control
B	Shaft			A	Not Req.	Attach to 9A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	IDENTIFICATION CODES
10	47KΩ	½		BTS-47K	Yl.-Vi.-Or. Tone Compensation
11	250KΩ	½		BTS-270K	Red-Grn.-Yl. RF Grid
12	250KΩ	½		BTS-270K	Red-Grn.-Yl. AF Screen Dropping
13	250KΩ	½		BTS-270K	Red-Grn.-Yl. AF Plate Load
14	250KΩ	½		BTS-270K	Red-Grn.-Yl. Bleeder
15	500KΩ	½		BTS-470K	Grn.-Blk.-Yl. Output Grid
16	4700Ω	½		BTS-4700	Yl.-Vi.-Red AF Cathode
17	4700Ω	½		BTS-4700	Yl.-Vi.-Red Filter
18	180Ω	½		BW-½-180	Br.-Gray-Br. "
19	180Ω	½		BW-½-180	Br.-Gray-Br. Output Cathode
20	33Ω	½		BW-½-33	Or.-Or.-Blk. Rectifier Ballast
21	130Ω	10		ABA-150	Line Dropping-See Note

Note-On IRC replacement set slider at 130Ω from one end.

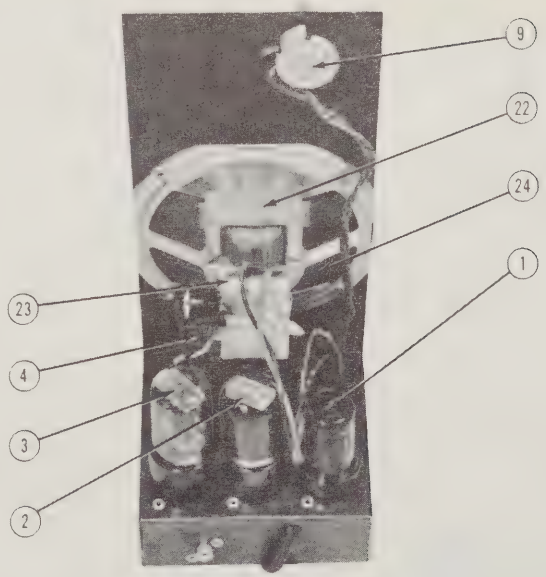
TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: AIRLINE PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.	INSTALLATION NOTES
22	2000Ω	2.8Ω	180Ω	.5Ω		A-3876#	T22S45#	A-2928#	#Bend mounting tabs down, file out slots and mount on original bracket.

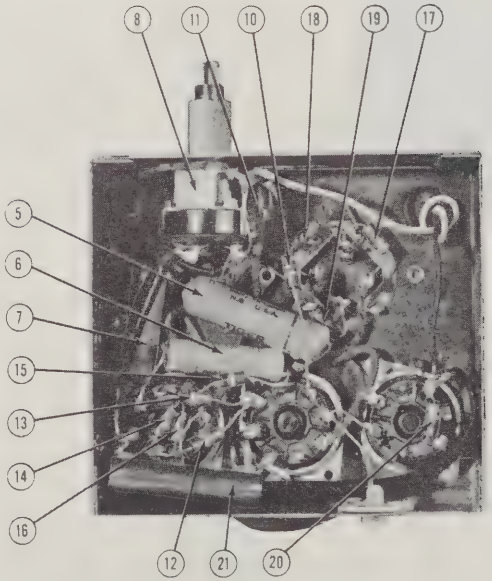
SPEAKER

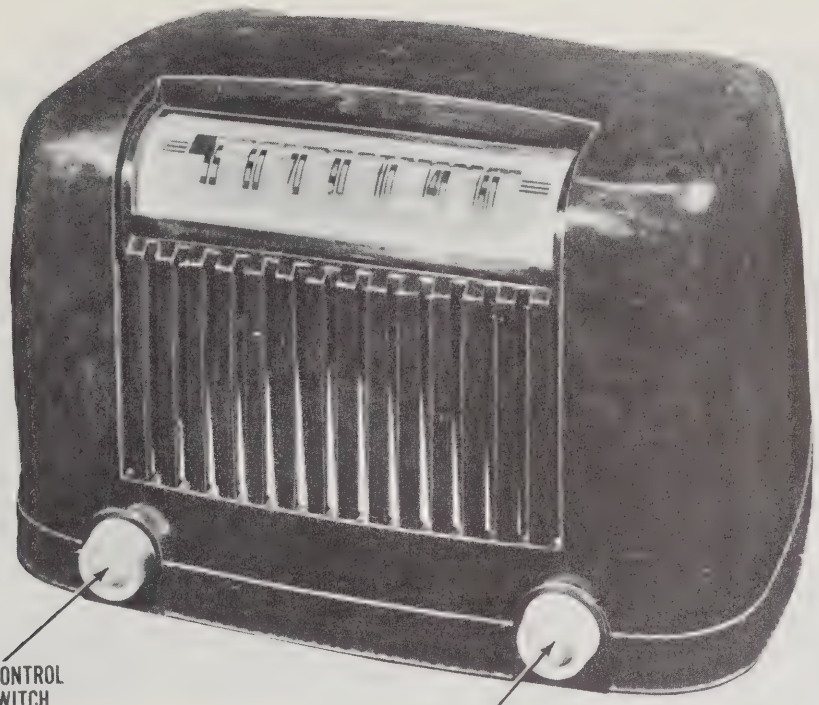
ITEM No.	RATINGS		REPLACEMENT DATA: AIRLINE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-105†		†Trim flange.
23	PM	2.9Ω		Mod. P5-X	5A15†	
	CONE DIA.	VC DIA.				
24	4½"	9/16"				

CHASSIS—TOP VIEW



CHASSIS—BOTTOM VIEW





BENDIX MODEL 55P2

TRADE NAME	Bendix, Models 55L2, 55L3, 55P2, 55P3
MANUFACTURER	Bendix Radio, Div. of Bendix Aviation Corp., Baltimore, Maryland
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12SA7GT Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-120 Volts AC-DC
TUNING RANGE—BROADCAST	540-1620KC RATING .23 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer turn tuning cap. fully closed and set pointer 1-1/8" from extreme left edge of dial backplate mounting bracket. This is the calibration mark referred to in Steps below. Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01 MFD	High side to ext. ant. lead. Low side to B-.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2	50MMFD.	"	1475KC	3-7/16" from calibration mark.	"	A5	Adjust for maximum output.
3	50MMFD.	"	"	Tune for maximum output.	"	A6	" " " "
4	50MMFD.	"	965KC	2-1/8" from calibration mark.	"		Check calibration. If calibration is not within reasonable tolerance bend osc. and ant. rotor plates of tuning cap. for maximum output. Then repeat Steps 2, 3 and 4 until no further improvement can be made.
5	50MMFD.	"	580KC	7/16" from calibration mark.	"		Check calibration. If calibration is not within reasonable tolerance bend ant. rotor plates of tuning cap. Then repeat Steps 2, 3, 4 & 5 until no further improvement can be made.

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BENDIX MODELS 55L2, 55L3, 55P2, 55P3

BENDIX MODELS 55L2, 55L3, 55P2, 55P3

PARTS LIST AND DESCRIPTIONS

BENDIX MODEL 55P2

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: BENDIX PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7GT	12SA7GT	8AD	
2	IF Amp.	12SK7	12SK7	8N	
3	Det.-AVC-AF	12SQ7	12SQ7	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: BENDIX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	150	CE2E01	PRSA150/40-40	EDL4415	DSB-2x40-150	TA-440	Filter-Blue
B	40	150						" -Red
7	.05	400	CP4T40	484-05	GT4S5	ST-4-05	TC-15	Line Filter
8	.1	400	CP4T51	484-.1	GT4P1	ST-4-1	72P2	Line Isolation
9	.02	400	CP4T34	484-02	GT4S2	ST-4-02	TC-12	Output Plate Bypass
10	.006	400	CP4T20	484-006	GT6D6	ST-6-006	TC-26	Audio Coupling
11	.006	400	CP4T20	484-006	GT6D6	ST-6-006	TC-26	" "
12	.05	400	CP4T40	484-05	GT4S5	ST-4-05	TC-15	AVC Filter
13	220	500	CC6A38	1468-00025	5W5T25	MO.5-325	1FM-325	Output Grid Byp.-Cer.
14	47	500		1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.
15	5	300	CC9A18	1468-000005	5W5V5	MO.5-55	MS-55	Ext. Ant. Coupling-Cer.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
16A	500KΩ	½	RV0S02	D13-133	M-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 16A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

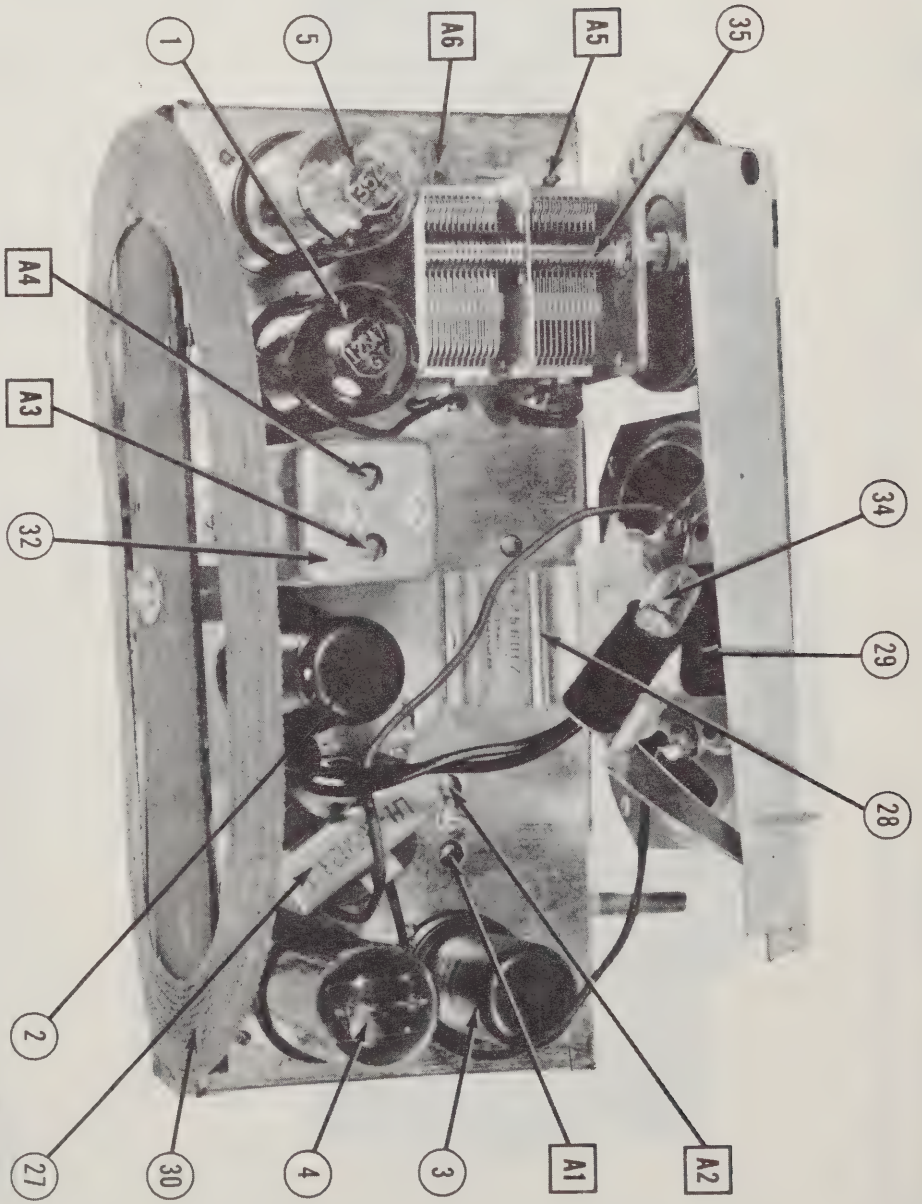
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	IDENTIFICATION CODES
17	22KΩ	½	HRC22A223M	BTS-22K	Red-Red-Or. Oscillator Grid
18	15 Meg.	½	HRC22A156M	BTS-15 Meg.	Br.-Grn.-Blue AVC Network
19	3.3 Meg.	½	HRC22A335M	BTS-3.3 Meg.	Or.-Or.-Grn. " "
20	47KΩ	½	HRC22A473M	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
21	5.6 Meg.	½		BTS-5.6 Meg.	Grn.-Blue-Grn. AF Grid-See Note
22	220KΩ	½		BTS-220K	Red-Red-Yl. AF Plate Load
23	470KΩ	½	HRC22A474M	BTS-470K	Yl.-Vi.-Yl. Output Grid
24	150Ω	1	HRC24A151K	BW-1-150	Br.-Grn.-Br. Output Cathode
25	2200Ω	1	HRC25A222M	BT-2-2200	Red-Red-Red Filter
26	220KΩ	½		BTS-220K	Red-Red-Yl. Line Isolation

Note-Some models may use 4.7 Meg. in this application. IRC replacement BTS-4.7 Meg.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: BENDIX PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
27	2000Ω	3.3Ω	170Ω tapped @ 10Ω	.6Ω	TA0010	A-3330		A-3031	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	VC IMP.	BENDIX PART No.	JENSEN PART No.	QUAM PART No.	
28	PM	3.3Ω	SP4R01	ST-105† Mod. P5-X	4A07†	†Fabricate new mounting bracket.
	CONE DIA.	VC DIA.				
29	4"	9/16"				

R F COILS

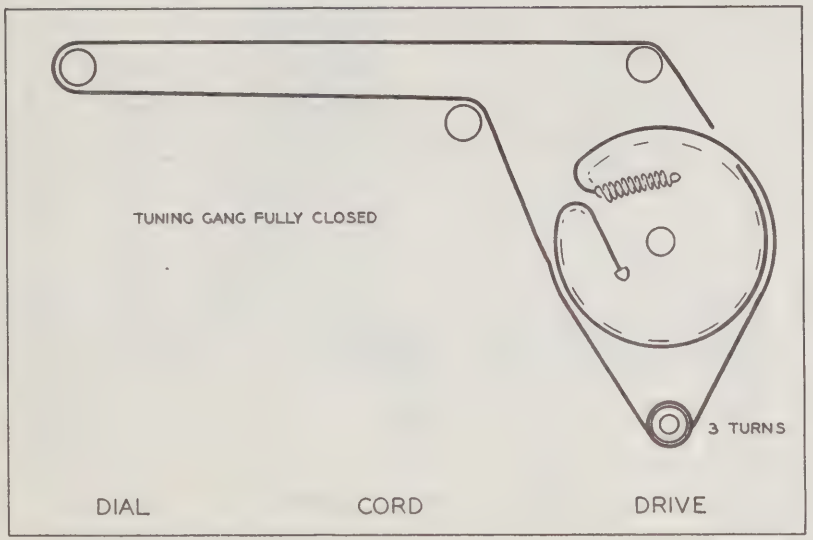
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	BENDIX PART No.	MEISSNER PART No.	
30	Loop Ant.		1.2Ω	AL0C08		
31	Osc. Coil	.7Ω	4.7Ω	L05B03	14-1060	
32	Input IF	17Ω	17Ω	TI0C11	16-6658	
33	Output IF	37Ω	37Ω	TI0D21	16-6670	

DIAL LIGHT

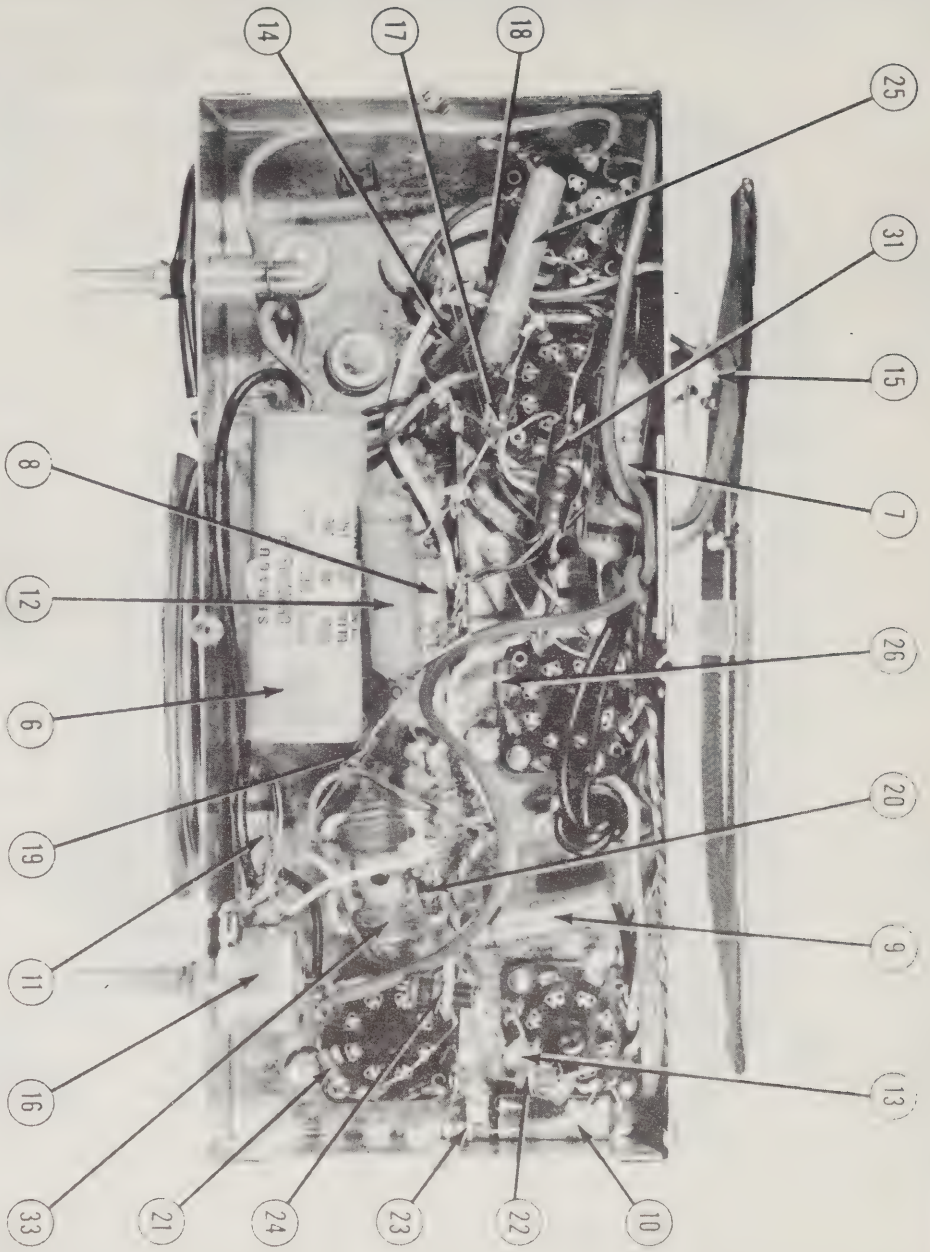
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					BENDIX PART No.		
34	Bayonet	6-8	0.15	Brown	#47		Type #47

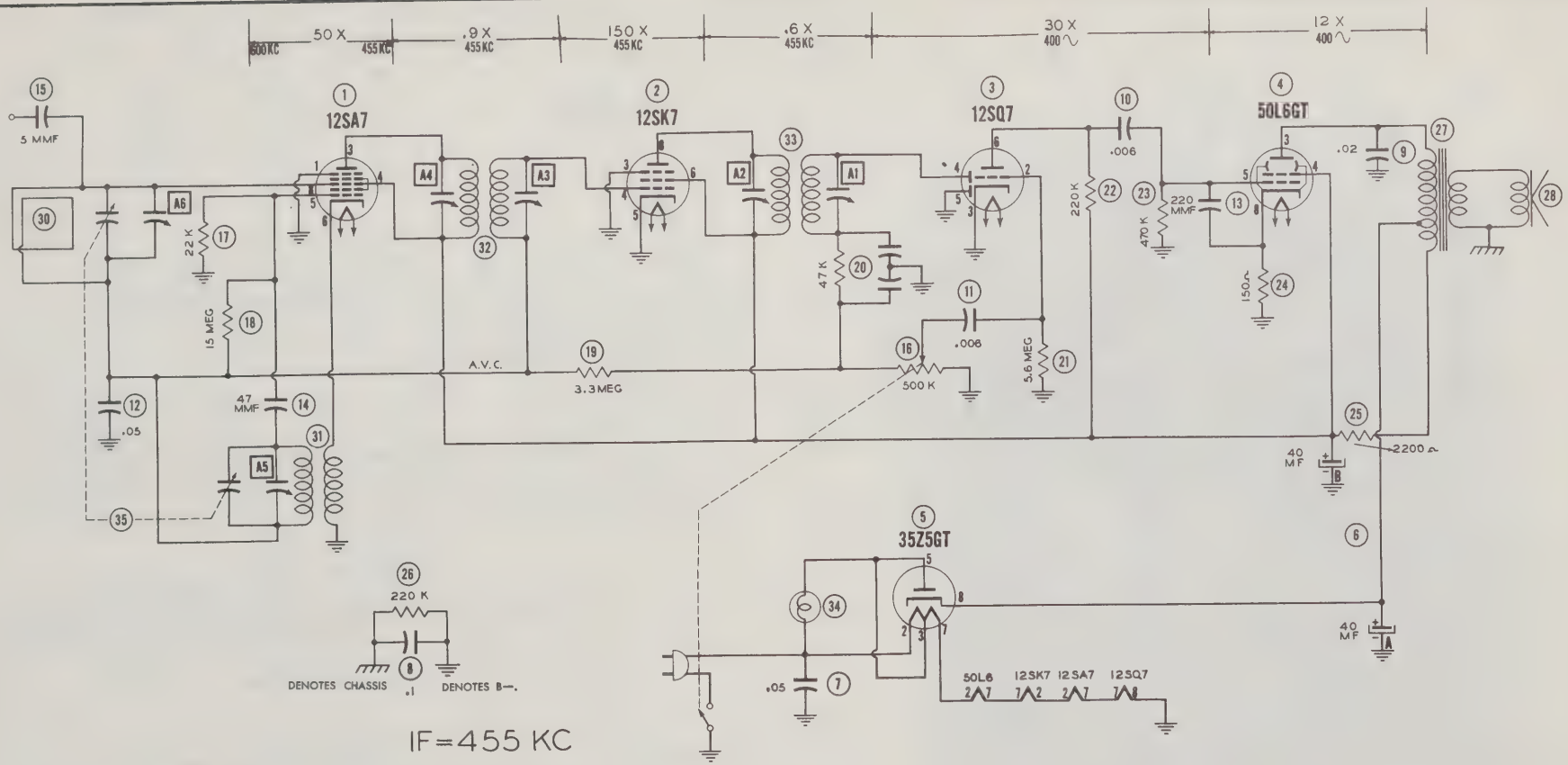
MISCELLANEOUS

ITEM No.	PART NAME	BENDIX PART No.	NOTES
35	2 Gang Var. Cap.	CV0B05	(38-476MMF, 38-220MMF)
	Dial Pointer	IDOM17	
	Dial Scale	DS0A32	Model 55L2
	" "	DS0A31	Model 55P2
	" "	DS0A34	Model 55L3
	" "	DS0A33	Model 55P3



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0V.	25VAC	85VDC	85VDC	-5.4VDC§	0V.	12VAC	-.3VDC
2	12SK7	0V.	25VAC	0V.	-.4VDC	0V.	85VDC	38VAC	85VDC
3	12SQ7	0V.	-.4VDC	0V.	-.9VDC	0V.	50VDC	12VAC	0V.
4	50L6GT	0V.	90VAC	123VDC	85VDC	0V.	0V.	38VAC	6.2VDC
5	35Z5GT	0V.	117VAC	113VAC	0V.	113VAC	125VDC	90VAC	130VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	INF.	27Ω	120KΩ	120KΩ	22KΩ	.7Ω	13Ω	4 Meg.
2	12SK7	220KΩ	27Ω	0Ω	4 Meg.	0Ω	120KΩ	42Ω	120KΩ
3	12SQ7	220KΩ	4.7 Meg.	0Ω	550KΩ	0Ω	340KΩ	13Ω	0Ω
4	50L6GT	INF.	90Ω	120KΩ	120KΩ	470KΩ	INF.	42Ω	150Ω
5	35Z5GT	INF.	120Ω	117Ω	INF.	117Ω	120KΩ	90Ω	120KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

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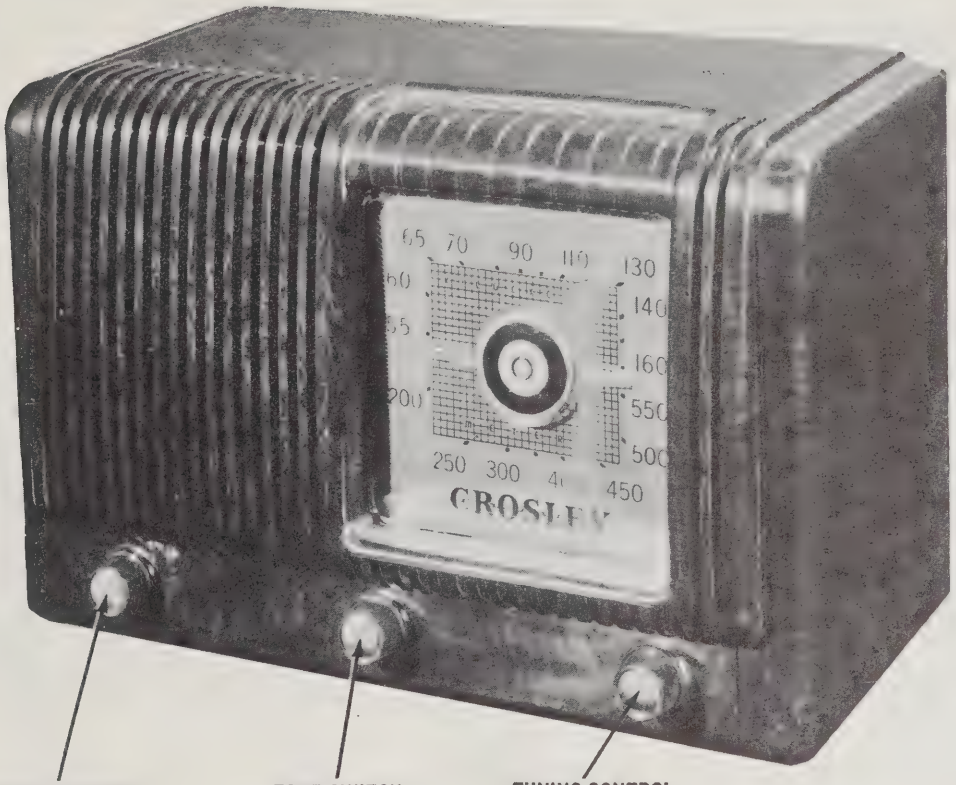
The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

CROSLEY MODEL 9-117
BATTERY-OPERATED



CROSLEY MODEL 9-117
BATTERY-OPERATED

CROSLEY MODEL 9-117

TRADE NAME	Crosley, Model 9-117
MANUFACTURER	Crosley Corp., 1329 Arlington St., Cincinnati, Ohio
TYPE SET	Battery Operated Superheterodyne Receiver
TUBES (FOUR)	Types, 1A7GT Converter, 1N5GT IF Amplifier, 1H5GT Det.-AVC-AF, 1A5GT Power Output
POWER SUPPLY RATING	1.5 Volts "A" Supply and 90 Volts "B" Supply 210MA @ 1.5V DC & 8MA @ 90V DC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer parallel with base of dial. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	200MMFD	High side to ant. lead (Red wire). Low side to chassis.	455KC	Tuning cap. fully closed	Across voice coil	A1,A2, A3,A4	Adjust for maximum output.
2	200MMFD	"	1620KC	Tuning cap. fully open.	"	A5	Adjust for maximum output. Trimmer opposite A5 is a factory adjustment and ordinarily need not be adjusted.
3	200MMFD	"	1400KC	Tune for maximum output.	"	A6	Adjust for maximum output. The trimmer opposite A6 is a factory adjustment and ordinarily need not be adjusted.

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DATE 12/48-#4821-5 SET #51-FOLDER #5

PARTS LIST AND DESCRIPTIONS

CROSLEY MODEL 9-117

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: CROSLEY PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	1A7GT	1A7GT	7Z	
2	IF Amp.	1N5GT	1N5GT	5Y	
3	Det.-AVC-AF	1H5GT	1H5GT	5Z	
4	Power Output	1A5GT	1A5GT	6X	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: CROSLEY PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
5	15	100	B-143027	PRS150/16	BR1615	M-16-150	UT-161	Pwr. Supply Bypass
6	.002	600	39001-74	684-002	GT6D2	ST-6-002	TC-22	Output Plate Bypass
7	.003	600	39001-76	684-003	GT6D3	ST-6-003	TC-23	Audio Coupling
8	.003	600	39001-76	684-003	GT6D3	ST-6-003	TC-23	" "
9	.001	600	39001-7	684-001	GT6D1	ST-6-001	TC-21	Tone Comp.
10	.02	200		484-02	GT2S2	ST-4-02	TC-12	Conv. Screen Bypass
11	.05	200		484-05	GT2S5	ST-4-05	TC-15	AVC Filter
12	100	300	C-137727-1	1468-0001	5W5T1	M0.5-31	1FM-31	Output Grid Bypass
13	100	300	C-137727-1	1468-0001	5W5T1	M0.5-31	1FM-31	Osc. Grid Cap.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CROSLEY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
14A	1 Meg.	½	39368-14	D13-137	AM-63-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 14A per instructions
C	Switch		39369-2	42	SW-A2	" " " " "

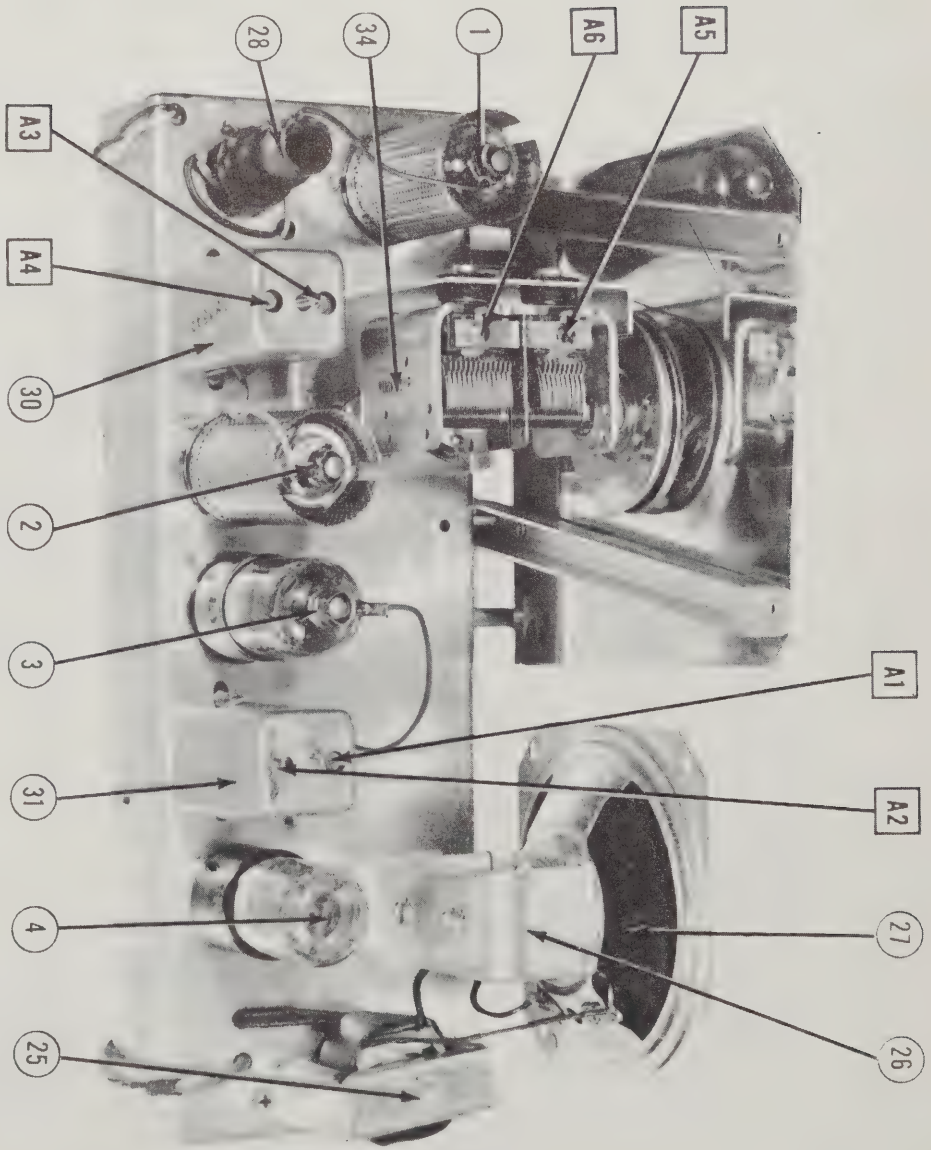
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CROSLEY PART No.	IRC PART No.	IDENTIFICATION CODES
15	220KΩ	½	39373-80	BTS-220K	Red-Red-Yl Oscillator Grid
16	47KΩ	½	39373-67	BTS-47K	Yl.-Vi.-Or. Converter Screen Dropping
17	4.7 Meg.	½	39373-102	BTS-4.7 Meg.	Yl.-Vi.-Grn. AVC Network
18	10 Meg.	½	39373-107	BTS-10 Meg.	Br.-Blk.-Blue " "
19	150KΩ	½	39373-77	BTS-150K	Br.-Grn.-Yl. Diode Filter
20	3300Ω	½	39373-44	BTS-3300	Or.-Or.-Red Series Volume Control
21	4.7 Meg.	½	39373-102	BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Grid
22	1 Meg.	½	39373-92	BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
23	2.2 Meg.	½	39373-97	BTS-2.2 Meg.	Red-Red-Grn. Output Grid
24	820Ω	½	39373-32	BTS-820	Gray-Red-Br. Bias

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: CROSLEY PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.	INSTALLATION NOTES
25	22KΩ	4.0Ω	720Ω	.5Ω	B-143196	A-3327#	T22S48#	A-2937#	#Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			CROSLEY PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-114†		†Drill and tap magnet frame.
26	PM	4.0Ω	AD-139631	Mod. P4-X	4A07†	
	CONE DIA.	VC DIA.				
27	4"	9/16"				

R F COILS

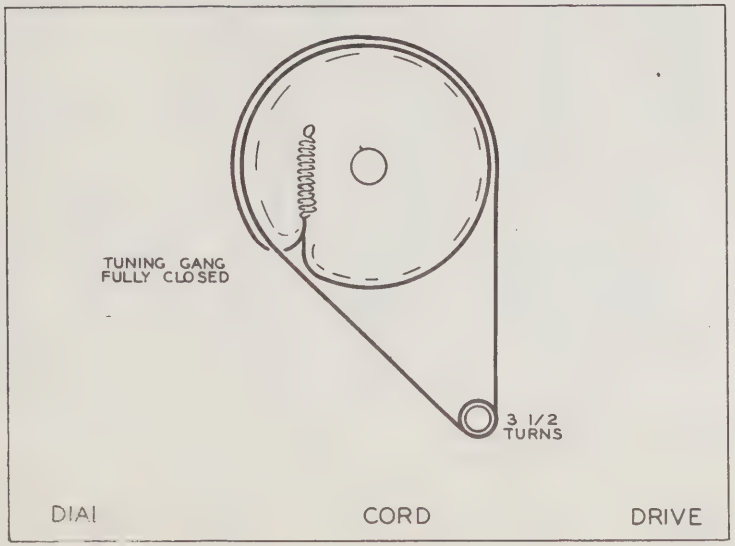
ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	CROSLEY PART No.	MEISSNER PART No.
28	Ant. Coil	48Ω	4.8Ω	AW-142997	14-1056
29	Osc. Coil	2Ω	6Ω	AW-143261	14-1060
30	Input IF	16.5Ω	17Ω	AW-134348	16-6658
31	Output IF	41Ω	15.5Ω	AW-134349	

BATTERIES

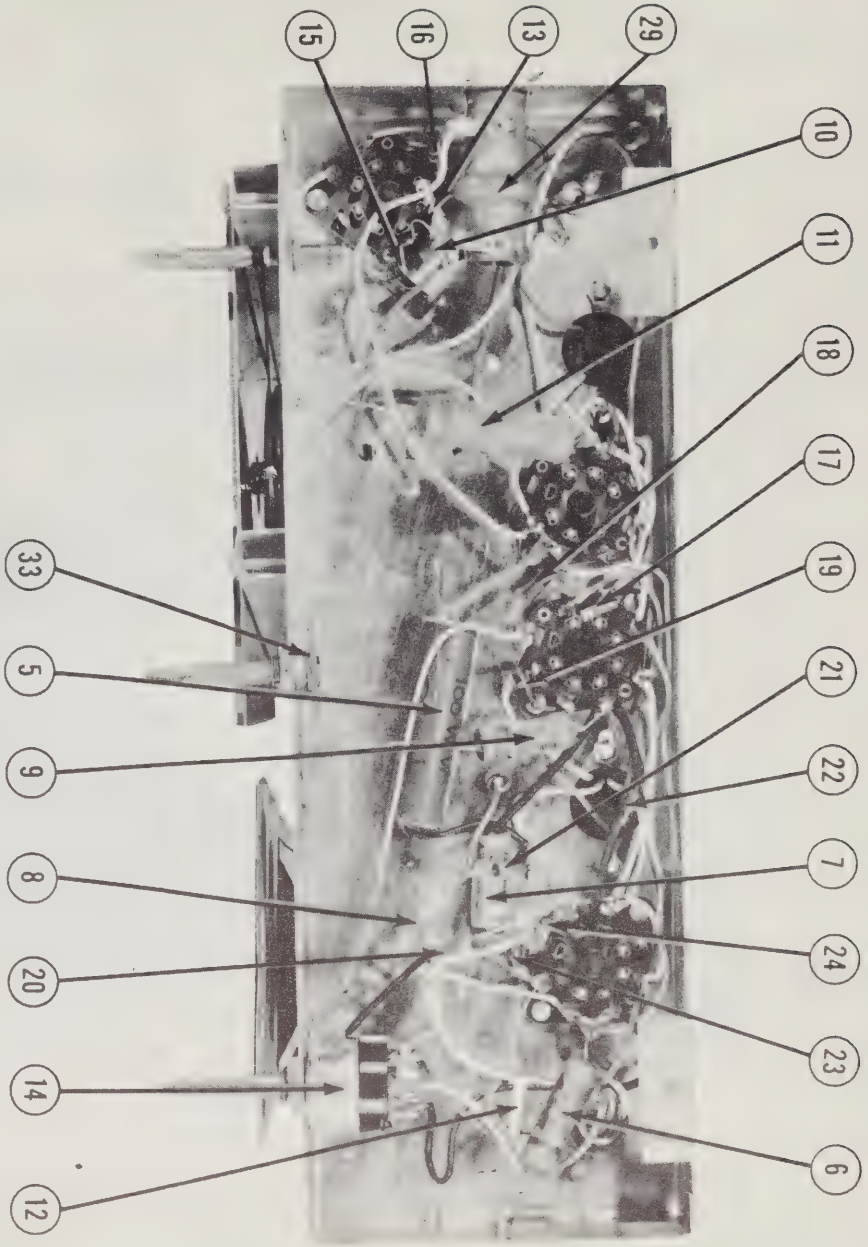
ITEM No.	VOLTAGE	CROSLEY PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
32	1.5V "A" 90V "B"	CR69			758			17GD60	

MISCELLANEOUS

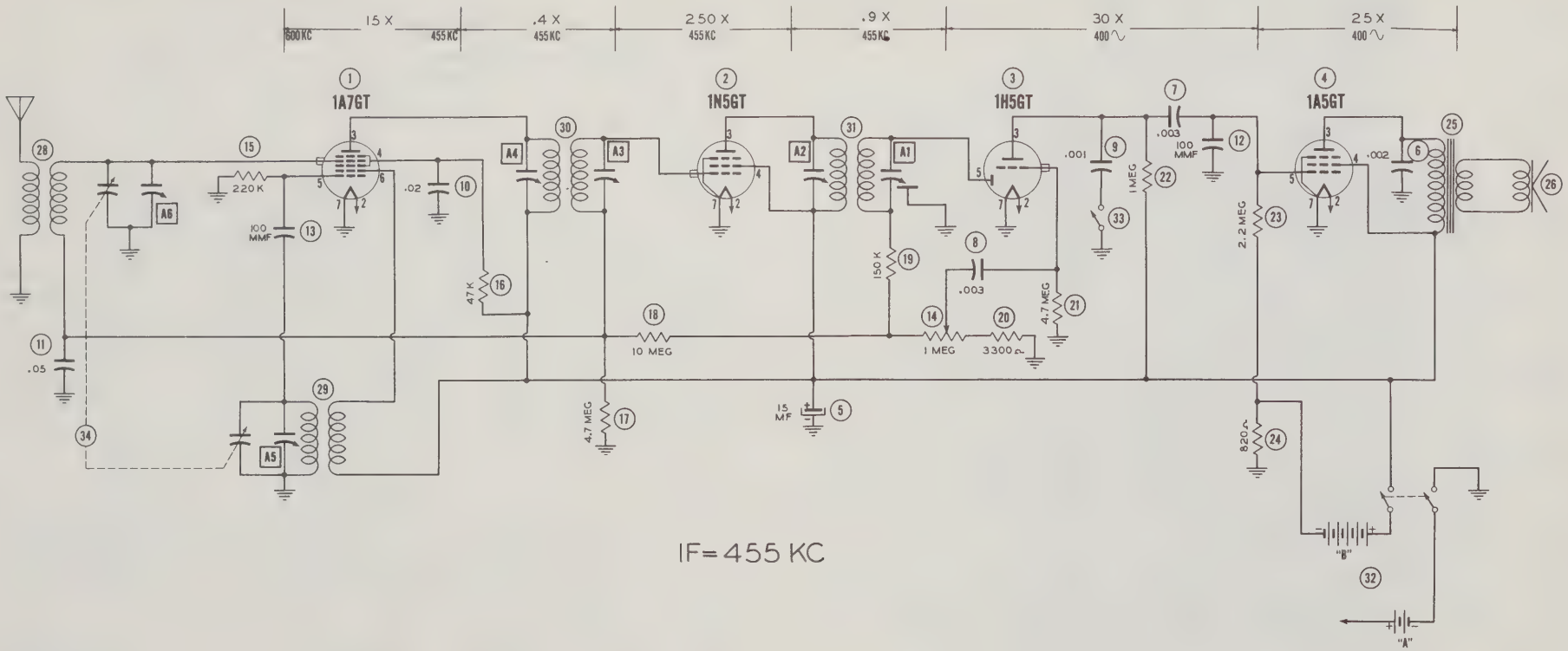
ITEM No.	PART NAME	CROSLEY PART No.	NOTES
33	Switch	W-143207	Tone
34	2 Gang Var. Cap.	B-143204	(42-472MMF, 37-198MMF)
	Cabinet	R-143226	
	Knob	B-138576-48	
	Dial Pointer	B-143252	
	Dial Lens	B-132258	



CHASSIS—BOTTOM VIEW



CROSLEY MODEL 9-117



IF = 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	1A7GT/G	0V.	1.5VDC	83VDC	50VDC	-6VDC§	83VDC	0V.	0V.	0V.
2	1N5GT/G	0V.	1.5VDC	83VDC	83VDC	83VDC	0V.	0V.	0V.	0V.
3	1H5GT/G	0V.	1.5VDC	53VDC	-.2VDC	-.2VDC	-.2VDC	0V.	0V.	0V.
4	1A5GT/G	0V.	1.5VDC	81VDC	83VDC	-.8VDC	-6.2VDC	0V.	83VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	1A7GT/G	0Ω	*	60KΩ	110KΩ	220KΩ	60KΩ	0Ω	INF.	3.7 Meg.
2	1N5GT/G	0Ω	*	60KΩ	60KΩ	60KΩ	INF.	0Ω	3.5 Meg.	3.7 Meg.
3	1H5GT/G	0Ω	*	1 Meg.	1.2 Meg.	1.2 Meg.	1 Meg.	0Ω	3.5 Meg.	4.7 Meg.
4	1A5GT/G	INF.	*	60KΩ	60KΩ	2.2 Meg.	820Ω	0Ω	60KΩ	-

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY
ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4821-5

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, by shorting AVC to chassis.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.

GAROD MODEL 4B-1
BATTERY OPERATED

GAROD MODEL 4B-1
BATTERY OPERATED

GAROD MODEL 4B-1

TRADE NAME	Garod, Model 4B-1
MANUFACTURER	Garod Radio Corp., 70 Washington St., Brooklyn 1, New York
TYPE SET	Battery Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 1R5 Converter, 1L4 IF Amp., 1S5 Det.-AVC-AF, 3S4 Power Output
POWER SUPPLY RATING	1.5 Volts "A" Supply and 67.5 Volts "B" Supply 260MA @ 1.5 Volts DC and 9MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540-1650KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.05 MFD.	High side to large stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4	Remove two loop mounting screws and move away from IF transformers. Adjust A1 thru A4 for maximum output. Replace loop.
2		Loop	1650KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1500KC	Tune for maximum output.	"	A6	Adjust for maximum output.

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DATE 12/48-#4821-6 SET #51-FOLDER #6

PARTS LIST AND DESCRIPTIONS

GAROD MODEL 4B-1

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		GAROD PART No.	STANDARD REPLACEMENT		
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1L4	1L4	6AR	
3	Det.-AVC-AF	1S5	1S5	6AU	
4	Power Output	3S4	3S4	7BA	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	GAROD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
5	8	100	5.426*	PRS150/8	BR815	M-8-150	UT-81	Power Supply Bypass
6	.005	600		684-005	GT6D5	ST-6-005	TC-25	Output Plate Bypass
7	.005	600		684-005	GT6D5	ST-6-005	TC-25	Audio Coupling
8	.005	600		684-005	GT6D5	ST-6-005	TC-25	" "
9	.02	200		484-02	GT2S2	ST-4-02	TC-12	AF Screen Bypass
10	.02	200		484-02	GT2S2	ST-4-02	TC-12	Screen Decoupling
11	.02	200		484-02	GT2S2	ST-4-02	TC-12	AVC Filter
12	.02	200		484-02	GT2S2	ST-4-02	TC-12	" "
13	100	300		1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass-Cer.
14	100	300		1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.
15	47	300		1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.-Cer.

*In some models Part #5.417 may be used.

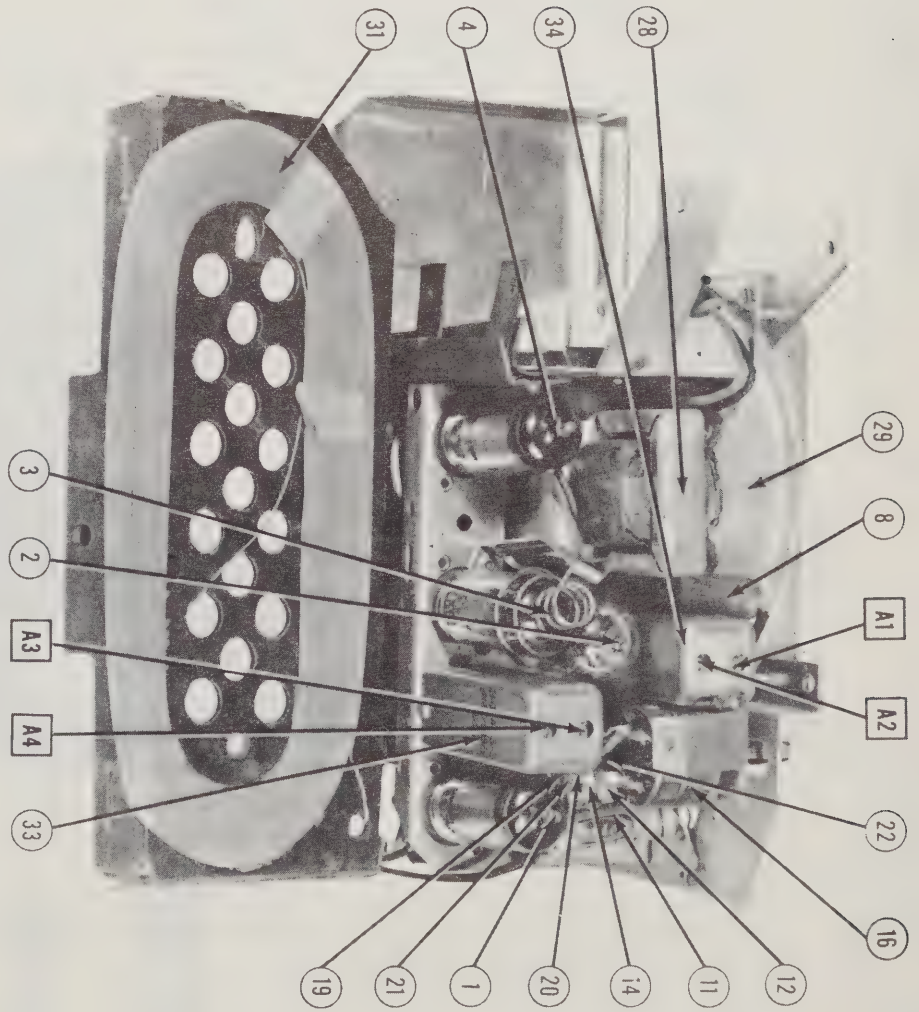
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	GAROD PART No.	IRC PART No.	CLAROSTAT PART No.	
16A	2 Meg.	½	8.201-6		15/16-66-Z	Volume Control
B	Shaft		Not Req.		KSS-3	Attached at factory.
C	Switch		" "		DPST Sw.	" " "

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	GAROD PART No.	IRC PART No.	
17	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Oscillator Grid
18	4700Ω	½		BTS-4700	Yl.-Vi.-Red Screen Decoupling
19	3.3 Meg.	½		BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
20	4.7 Meg.	½		BTS-4.7 Meg.	Yl.-Vi.-Grn. " "
21	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. " "
22	47KΩ	½		BTS-47K	Yl.-Vi.-Or. Diode RF Filter
23	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
24	4.7 Meg.	½		BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Screen Dropping
25	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
26	3.3 Meg.	½		BTS-3.3 Meg	Or.-Or.-Grn. Output Grid
27	820Ω	½		BTS-820	Gray-Red-Br. Bias

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		GAROD PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
28	7400Ω	3.4Ω	400Ω	.75Ω	Part of 30.317	A-3329#		A-2998#	#Bend mounting tabs down, file out slots and mount on original bracket.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			GAROD PART No.	JENSEN PART No.	QUAM PART No.	
29	FIELD PM	VC IMP. 3.4Ω	30.317			
30	CONE DIA. 4"	VC DIA. 9/16"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	GAROD PART No.	MEISSNER PART No.
31	Loop Ant.		3.2Ω	1.468	
32	Osc. Coil	2Ω	8Ω	1.470	
33	Input IF	36Ω	37Ω	1.412-3	16-6668
34	Output IF	39Ω	36Ω	1.413-3	16-6669

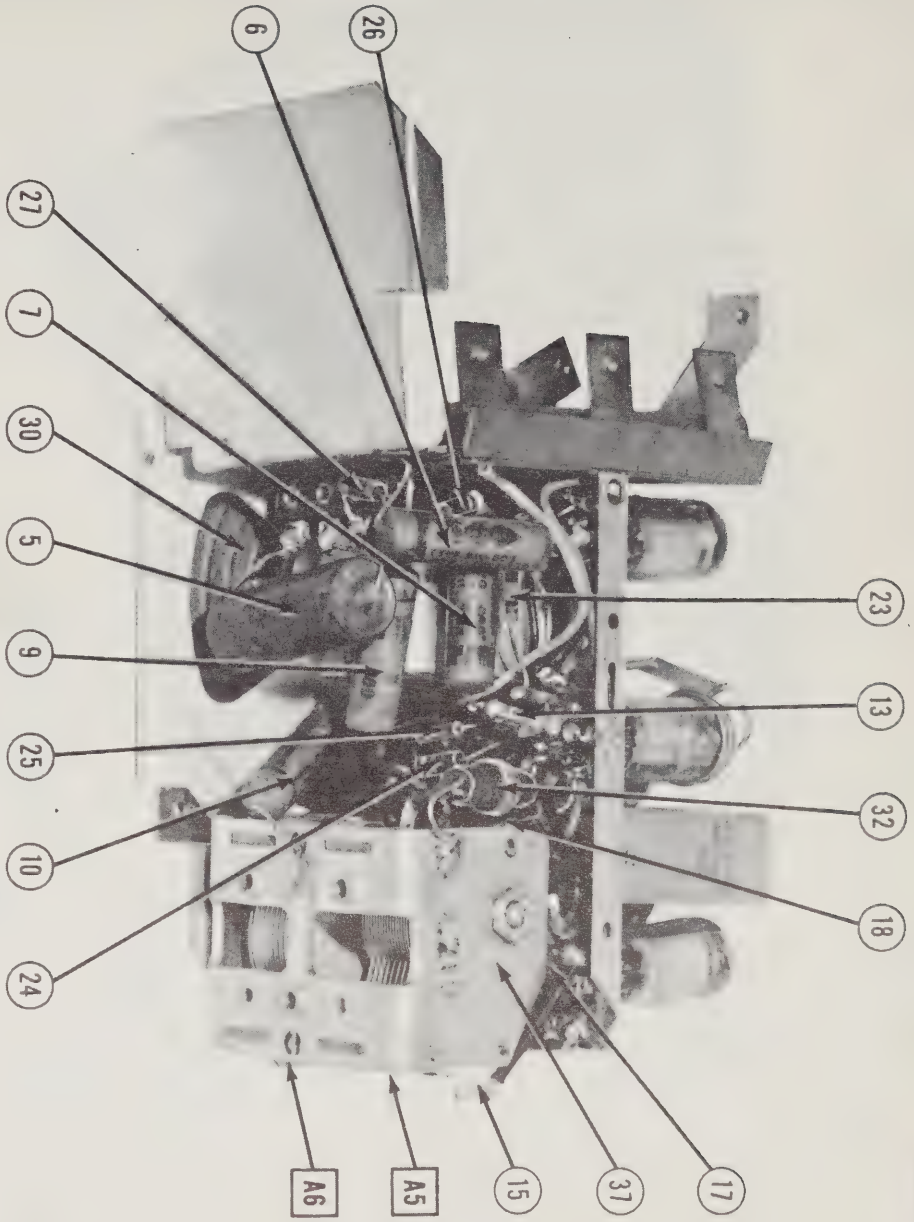
BATTERIES

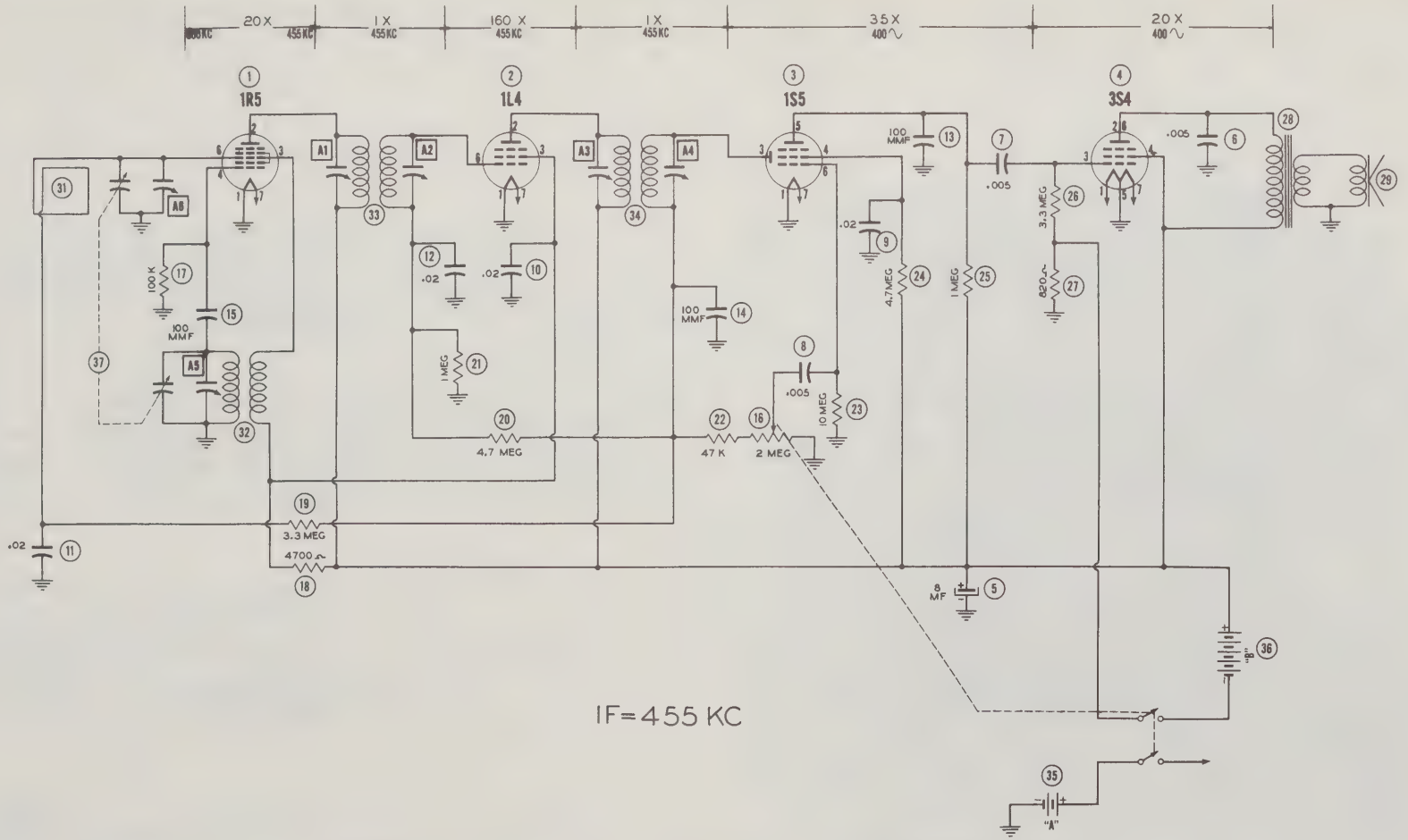
ITEM No.	VOLTAGE	GAROD PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
35	1.5V "A"		950			2R			3 Used in Parallel
36	67.5V"B"			467			XX45		

MISCELLANEOUS

ITEM No.	PART NAME	GAROD PART No.	NOTES
37	2 Gang Var. Cap.	2.215	(26-381MMF, 35-195MMF)

CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	0V.	60VDC	47VDC	-6.4VDC§	0V.	0V.	1.5VDC
2	1L4	0V.	60VDC	47VDC	60VDC	0V.	0V.	1.5VDC
3	1S5	0V.	60VDC	0V.	2.3VDC	23VDC	0V.	1.5VDC
4	3S4	1.5VDC	58VDC	-.5VDC	60VDC	0V.	58VDC	1.5VDC

§TAKEN WITH, VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	0Ω	60KΩ	65KΩ	100KΩ	0Ω	5 Meg.	*
2	1L4	0Ω	60KΩ	65KΩ	60KΩ	0Ω	850KΩ	*
3	1S5	0Ω	60KΩ	1.6 Meg.	4.7 Meg.	1.1 Meg.	10 Meg.	*
4	3S4	*	60KΩ	3.3 Meg.	60KΩ	0Ω	60KΩ	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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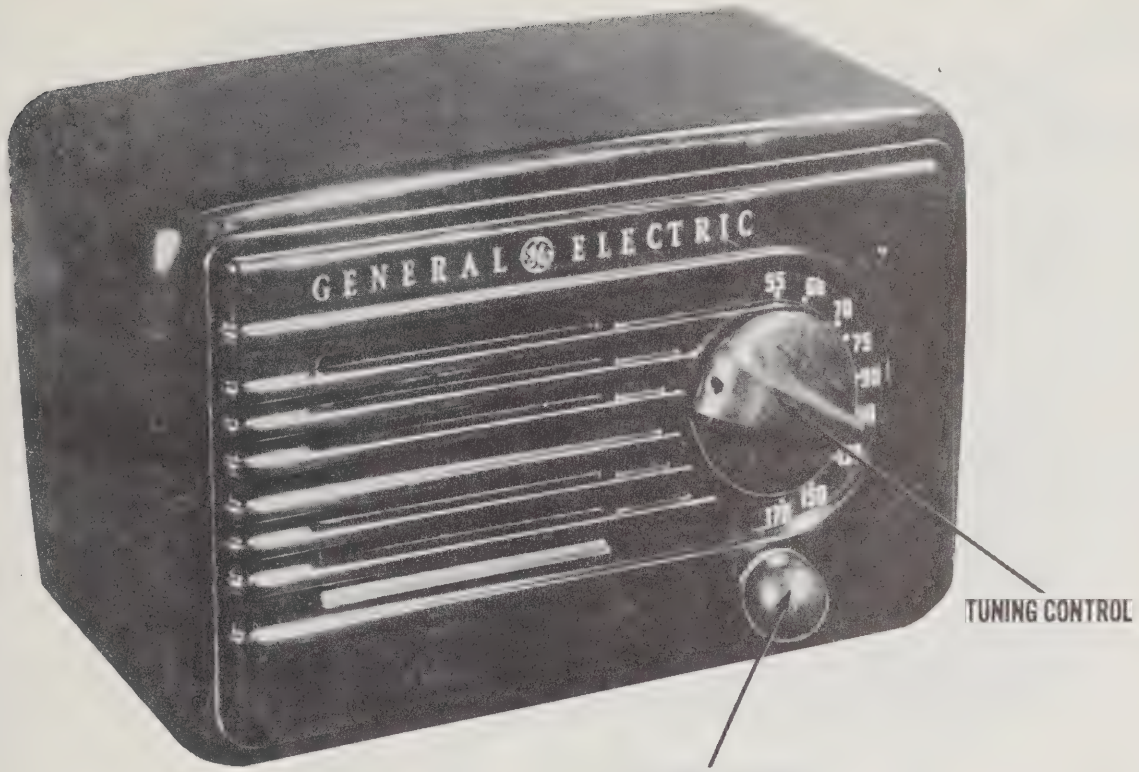
4821-6

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting across volume control.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.

GENERAL ELECTRIC
MODEL 113



GENERAL ELECTRIC
MODEL 113

GENERAL ELECTRIC MODEL 113

TRADE NAME	General Electric, Model 113
MANUFACTURER	General Electric Co., Electronics Dept., Electronics Park, Syracuse, N.Y.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12SA7 Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 50L6GT Power Output, 35W4 Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
TUNING RANGE—BROADCAST	540-1725KC RATING .25 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and chassis.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.05 MFD	High side to Pin 8 (grid) of 12SA7. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2		Loop	1725KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1500KC	Tune for maximum output.	"	A6	Adjust for maximum output.

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DATE 12/48-#4821-7 SET #51-FOLDER #7

PARTS LIST AND DESCRIPTIONS

GENERAL ELECTRIC
MODEL 113

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		GENERAL ELECTRIC PART No.	STANDARD REPLACEMENT		
1	Converter	12SA7	12SA7	8R	
2	IF Amp.	12SK7	12SK7	8N	
3	Det.-AVC-AF	12SQ7	12SQ7	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	GENERAL ELECT. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
6A	40	150	SCE-009	PRSA150/40-40	EDL-4415	DSB-2x40-150	TA440	Filter-Red
B	40	150						" -Blue
7	.05	600	UCC-635	684-05	GT6S5	ST-6-05	TC-15	Line Filter
8	.02	600	UCC-631	684-02	GT6S2	ST-6-02	TC-12	Output Plate Bypass
9	.01	600	UCC-630	684-01	GT6S1	ST-6-01	TC-11	Audio Coupling
10	.005	600	UCC-625	684-005	GT6D5	ST-6-005	TC-25	" "
11	.05	600	UCC-635	684-05	GT6S5	ST-6-05	TC-15	RF Bypass Pwr. Supply
12	.05	600	UCC-635	684-05	GT6S5	ST-6-05	TC-15	AVC Filter
13	330	500		1468-00035	5W5T3	MO.5-33	1FM-335	AF Plate Bypass-Cer.
14	120	500	UCU-1030	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass
15	10	300		1469-00001	5R5Q1	MOS.5-41	MS-41	Fixed Trimmer-Cer.-Note

Note-Not used in all models.

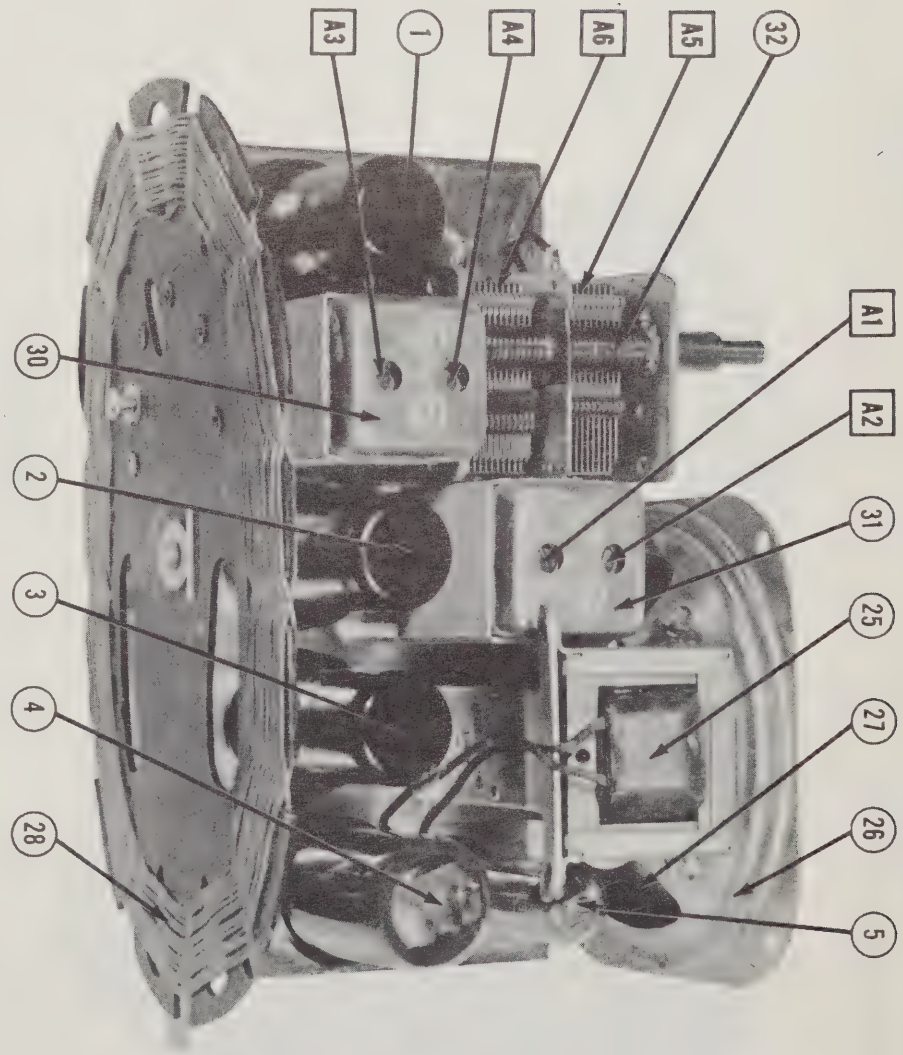
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	GEN. ELECT. PART No.	IRC PART No.	CLAROSTAT PART No.	
16A	500KΩ	½	SRC-004	D13-133	M-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 16A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	GENERAL ELECTRIC PART No.	IRC PART No.	
17	22KΩ	½	URD-081	BTS-22K	Red-Red-Or. Osc. Grid
18	2.2 Meg.	½	URD-129	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
19	6.8 Meg.	½		BTS-6.8 Meg.	Blue-Gray-Grn. AF Grid
20	220KΩ	½	URD-105	BTS-220K	Red-Red-Yl. AF Plate Load
21	470KΩ	½	URD-113	BTS-470K	Yl.-Vi.-Yl. Output Grid
22	150Ω	½	URD-029	BW-½-150	Br.-Grn.-Br. Output Cathode
23	1500Ω	2	URF-C53	BT-2-1500	Br.-Grn.-Red Filter
24	22Ω	½	URD-009	BW-½-22	Red-Red-Blk. Surge Limiter

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		GEN. ELECT. PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
25	2000Ω	3.6Ω	180Ω	.7Ω	STO-004	A-3876	T22845	A-2928	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			GENERAL ELECTRIC PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-113†		†Fabricate new mounting bracket.
26	PM	3.6Ω	UOP-487	Mod. P4-X	4A07†	
	CONE DIA.	VC DIA.				
27	4"	9/16"				

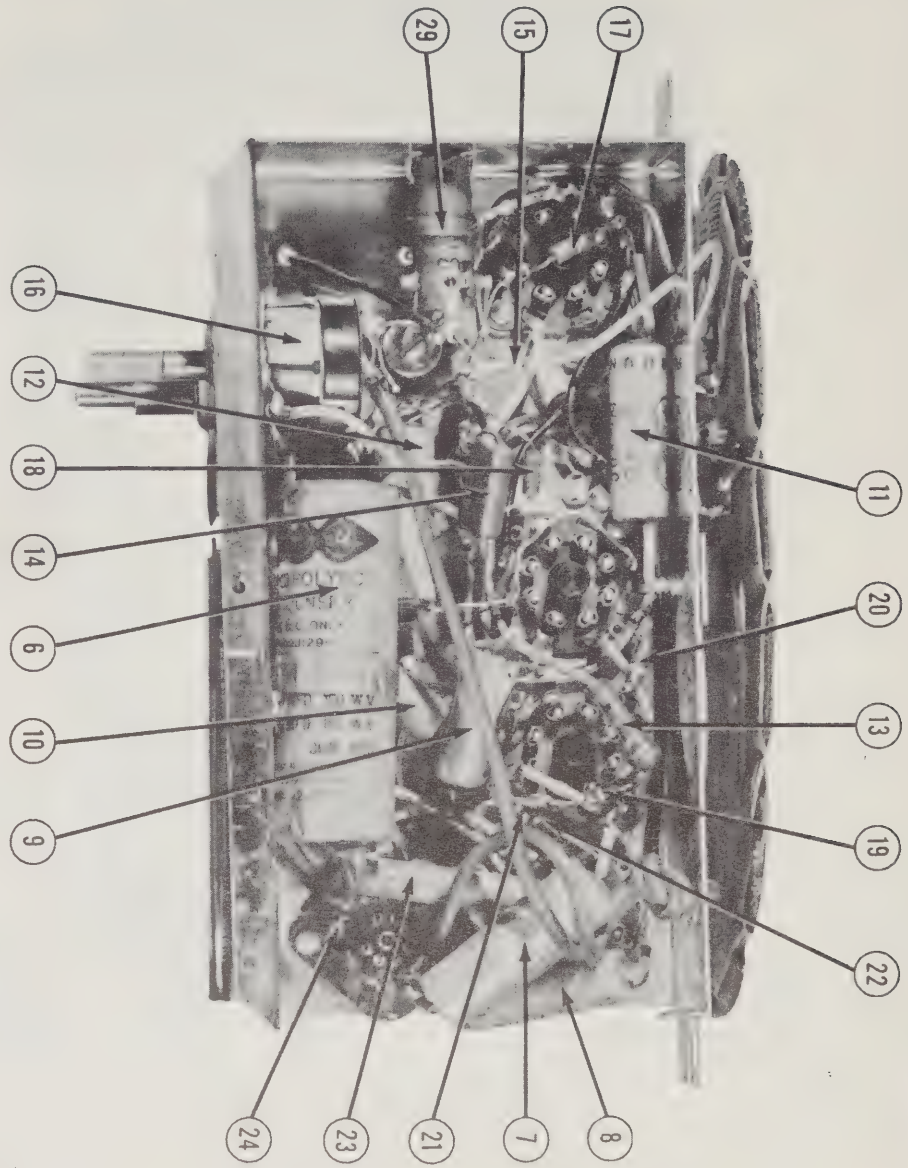
R F COILS

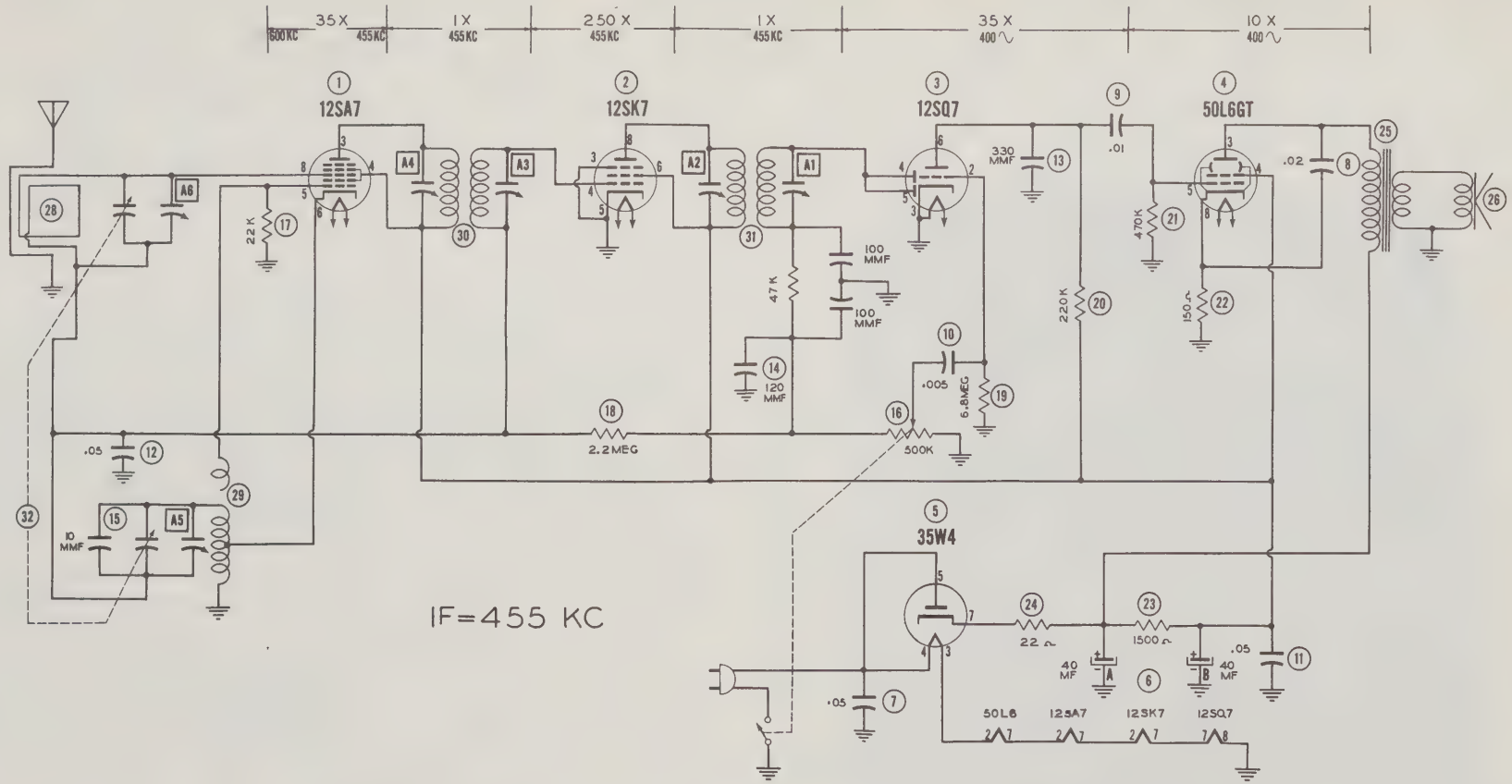
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	GEN. ELECT. PART No.	MEISSNER PART No.	
28	Loop Ant.	0Ω	1Ω	SLL-002		
29	Osc. Coil		9.3Ω	SLC-020	14-1060*	*Add 50 MMFD from high side tuning cap. to osc. grid.
30	Input IF	20Ω	19Ω	STL-007	16-6658	
31	Output IF	30Ω	30Ω	STL-008	16-6660	

MISCELLANEOUS

ITEM No.	PART NAME	GEN. ELECT. PART No.	NOTES
32	2 Gang Var. Cap	SCT-005	(22-414MMF, 17-167MMF)
	Cabinet	SAU-022	

CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0V.	36VAC	88VDC	88VDC	-8.5VDC§	0V.	24VAC	-.3VDC
2	12SK7	0V.	24VAC	0V.	-.3VDC	0V.	88VDC	12VAC	88VDC
3	12SQ7	0V.	-.5VDC	0V.	-.4VDC	-.4VDC	50VDC	12VAC	0V.
4	50L6GT	0V.	85VAC	124VDC	88VDC	0V.	5.8VDC	36VAC	5.8VDC
5	35W4	130VDC	130VDC	85VAC	117VAC	117VAC	112VAC	130VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7	0Ω	38Ω	32KΩ	32KΩ	22KΩ	1Ω	25Ω	2.7 Meg.
2	12SK7	0Ω	25Ω	0Ω	2.7 Meg.	0Ω	32KΩ	12Ω	32KΩ
3	12SQ7	0Ω	6.8 Meg.	0Ω	550KΩ	550KΩ	250KΩ	12Ω	0Ω
4	50L6GT	INF.	85Ω	30KΩ	32KΩ	470KΩ	150Ω	38Ω	150Ω
5	35W4	30KΩ	30KΩ	85Ω	120Ω	120Ω	110Ω	30KΩ	-

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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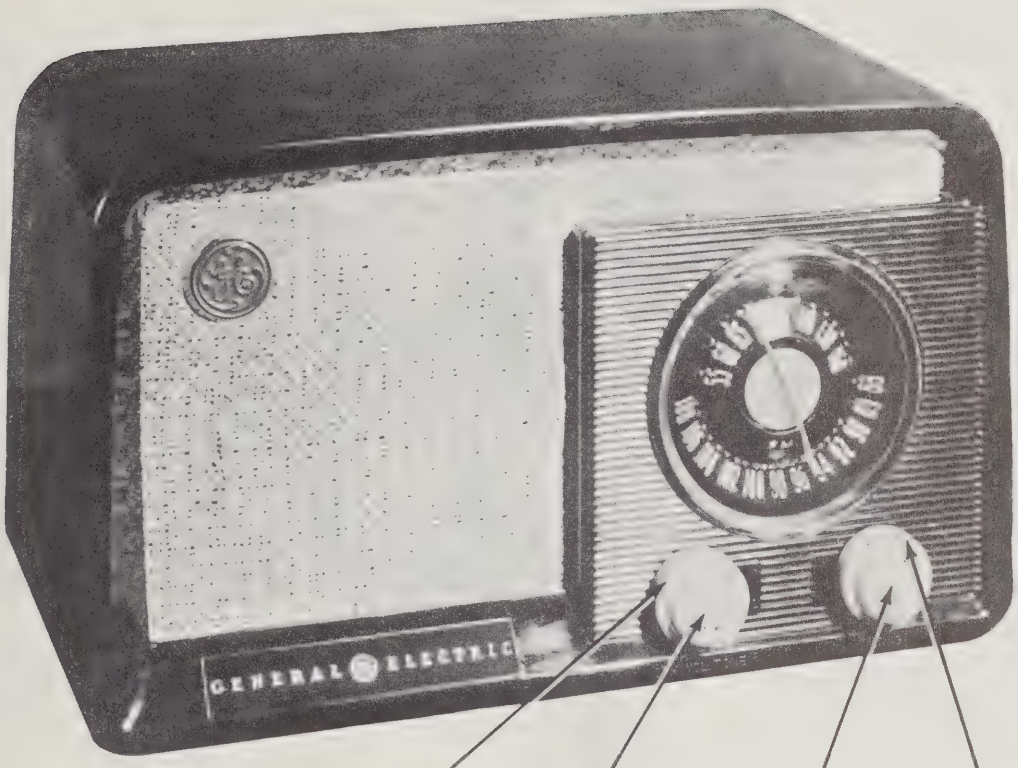
4821-7

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

GEN. ELECT. MODEL
210, 211, 212



GEN. ELECT. MODEL
210, 211, 212

GENERAL ELECTRIC MODEL 210

TRADE NAME	General Electric, Models 210, 211, 212
MANUFACTURER	General Electric Co., Electronics Dept., Electronics Park, Syracuse, N.Y.
TYPE SET	AC-DC Operated AM-FM Superheterodyne Receiver with Loop Antenna
TUBES (SEVEN)	Types, 6BJ6 FM RF Amp.-1st IF, 12BE6 Converter, 6BJ6 FM 2nd IF-AM 1st IF, 6BH6 Limiter, 19T8 FM Disc.-AM Det.-AVC-AF, 35B5 Power Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-DC
RATING	.23 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC FREQ. MOD. 88-108MC

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"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1948 by Howard W. Sams & Co., Inc., Indianapolis, Indiana, U. S. A. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	FM RF Amp.-1st IF	6BJ6	6BJ6	7CM	
2	Converter	12BE6	12BE6	7CH	
3	FM 2nd IF-AM 1st IF	6BJ6	6BJ6	7CM	
4	Limiter	6BH6	6BH6		
5	FM Disc.-AM Det. AVC-AF	19T8	19T8		
6	Power Output	35B5	35B5	7PZ	
7	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: GENERAL ELECT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
●A	75	200	RCE-065					● Filter
▲B	75	200						▲ "
■C	75	200						■ "
D	30	40						Cathode Bypass
9	.05	400		484-05	GT4S5	ST-4-05	TC-15	Line Filter-See Note 1
10	.005	600	UCC-625	684-005	GT6D5	ST-6-005	TC-25	Output Plate Bypass
11	.02	400	UCC-631	484-02	GT4S2	ST-4-02	TC-12	Audio Coupling
12	.005	200	UCC-625	484-005	GT6D5	ST-6-005	TC-25	" "
13	.02	400	UCC-631	484-02	GT4S2	ST-4-02	TC-12	" "
14	.003	200	UCC-623	484-003	GT6D3	ST-6-003	TC-23	Tone Compensation
15	.05	400	UCC-635	484-05	GT4S5	ST-4-05	TC-15	Isolation
16	.002	200	UCC-621	484-002	GT6D2	ST-6-002	TC-22	Tone Compensation
17	.02	400	UCC-631	484-02	GT4S2	ST-4-02	TC-12	Limiter Decoupling
18	.05	200	UCC-635	484-05	GT2S5	ST-4-05	TC-15	Limiter Grid Filter
19	.02	400	UCC-631	484-02	GT4S2	ST-4-02	TC-12	2nd IF Decoupling
20	.05	200	UCC-635	484-05	GT2S5	ST-4-05	TC-15	2nd IF Cathode Bypass
21	.02	400	UCC-631	484-02	GT4S2	ST-4-02	TC-12	Conv. Decoupling
22	.05	200	UCC-635	484-05	GT2S5	ST-4-05	TC-15	Fil. Bypass
23	.05	200	UCC-635	484-05	GT2S5	ST-4-05	TC-15	" "
24	.02	400	UCC-631	484-02	GT4S2	ST-4-02	TC-12	Reflex Amp. Decoup.
25	.05	200	UCC-635	484-05	GT2S5	ST-4-05	TC-15	Reflex Cathode Bypass
26	.05	200	UCC-635	484-05	GT2S5	ST-4-05	TC-15	AVC Filter
27	.01	400	UCC-630	484-01	GT4S1	ST-4-01	TC-11	Ext. Ant. Isolation
28	47	500	UCU-020	1468-00005	5W5Q5	MO.5-45	1FM-45	AF Plate Bypass
29	470	500	UCU-044	1468-0005	5W5T5	MO.5-35	1FM-35	Diode Load Cap.
30	150	500	UCU-032	1468-00015	5W5T15	MO.5-315	1FM-315	RF Bypass
31	47	500	UCU-020	1468-00005	5W5Q5	MO.5-45	1FM-45	AM Diode RF Filter
32	47	500	UCU-020	1468-00005	5W5Q5	MO.5-45	1FM-45	" " " "
33	47	500	UCU-020	1468-00005	5W5Q5	MO.5-45	1FM-45	" " " "
34	47	500	RCW-2010					Fixed Trimmer-Cer.-See Note 2
35	470	300	RCW-176	1468-0005	5W5T5	MO.5-35	1FM-35	Conv. Screen Byp.-Cer.
36	8	300	RCW-2033					Fixed Trimmer-Cer.-See Note 3
37	47	300	RCW-1052	1469-00005	5R5Q5	MOS.5-45	MS-45	FM Osc. Grid Cap.-Cer.
38	39	300	RCW-1057	1469-00004	5R5Q4	MOS.5-44	MS-44	Osc. Feedback-Cer.
39	20	300	RCW-3016	1468-000025	5W5Q25	MO.5-425	1FM-425	AM Osc. Grid Cap.-Cer.
40	10	300	RCW-1060	1468-00001	5W5Q1	MO.5-41	MS-41	RF Coupling-Cer.
41	3	300	RCW-3004	1468-000005	5W5V5	MO.5-55	MS-55	FM Ant. Coup.-Cer.
42	470	300	RCW-176	1468-0005	5W5T5	MO.5-35	1FM-35	FM Ant. Isolation-Cer.
43	47	500	UCU-020	1468-00005	5W5Q5	MO.5-45	1FM-45	FM Line Ant. Coup.

Note 1-May not be used in all models.
Note 2- ± 5% tol. zero temp. coef.
Note 3- 10% tol. neg. temp. coef.

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	REPLACEMENT DATA: MEISSNER PART No.
78	Loop Ant.	0Ω	2.3Ω	RAB-074	
79	FM WaveTrap		.2Ω	RLI-062	
80	FM Ant.Coil		0Ω	RLI-056	
81	FM RF Coil		0Ω	RLB-026	
82	Osc.Coil-AM		8.8Ω	RLC-066	14-1060
83	" " -FM		0Ω	RLC-067	
84	1st IF-AM	19Ω	12.5Ω	RTL-078	16-6678
85	1st IF-FM	.6Ω	.6Ω	RTL-077	
86	2nd IF-AM	17Ω	16Ω	RTL-054	16-6678
87	2nd IF-FM	.6Ω	.6Ω	RTL-077	
88	3rd IF-FM	.6Ω	.6Ω	RTL-077	
89	FM Det.Tran.	.6Ω	.8Ω	RTD-006	
90	FM Plate Chk		.1Ω	RLI-005	
91	AM Osc.Grid Choke		.1Ω	RLA-012	
92	Conv. Cath. Choke		.1Ω	RLI-057	
93	Lim. Cath. Choke		.6Ω	RLI-058	
94	Line Choke		.1Ω	RLI-044	
95	Fil. Choke		.1Ω	RLI-005	
96	" "		.1Ω	RLI-005	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	REPLACEMENT DATA	INSTALLATION NOTES
97	Bayonet	6-8	0.15	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	GENERAL ELECTRIC PART No.	NOTES
98	Switch	RSW-056	Band
99	"	RSW-057	Tone
100	2 Gang Var. Cap.	RCT-031	(17-488MMF, 14-128MMF)
	Cabinet	RAU-037	Model 210
	"	RAU-036	Model 211
	"	RAU-057	Model 212
	Pointer Assby.	RDP-039	
	Dial Scale	RDS-071	

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	GENERAL ELECTRIC PART No.	IRC PART No.	CLAROSTAT PART No.	
44	2 Meg.	½	RRC-082			Volume Control & Sw. tapped @ 1 Meg.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	GENERAL ELECTRIC PART No.	IRC PART No.	
45	470Ω	½	URD-041	BTS-470	Yl.-Vi.-Br. Ant. Loading
46	33KΩ	½	URD-085	BTS-33K	Or.-Or.-Or.-FM Ant. Loading
47	100Ω	½	URD-025		Br.-Blk.-Br. Reflex Amp. Cathode
48	1000Ω	½	URD-049	BTS-1000	Br.-Blk.-Red Reflex Amp. Decoup.
49	10KΩ	½		BTS-10K	Br.-Blk.-Or. FM RF Coil Shunt
50	1000Ω	½	URD-049	BTS-1000	Br.-Blk.-Red Conv. Decoup.
51	100Ω	½	URD-025		Br.-Blk.-Br. Parasitic Supp.
52	22KΩ	½	URD-081	BTS-22K	Red-Red-Or. Osc. Grid
53	2.2 Meg.	½	URD-129	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
54	100Ω	½	URD-025		Br.-Blk.-Br. 2nd IF Cathode
55	1000Ω	½	URD-049	BTS-1000	Br.-Blk.-Red 2nd IF Decoup.
56	1 Meg.	½	URD-121	BTS-1 Meg.	Br.-Blk.-Grn. Limiter Grid
57	2200Ω	½	URD-057	BTS-2200	Red-Red-Red Limiter Decoup.
58	33KΩ	½	URD-085	BTS-33K	Or.-Or.-Or. Limiter Cathode
59	10Ω	½	URD-001		Br.-Blk.-Blk. Parasitic Supp.
60	47KΩ	½	URD-089	BTS-47K	Yl.-Vi.-Or. Diode Filter
61	220KΩ	½	URD-105	BTS-220K	Red-Red-Yl. Diode Load
62	120KΩ	½	URD-099	BTS-120K	Br.-Red-Yl. Disc. Diode Load
63	120KΩ	½	URD-099	BTS-120K	Br.-Red-Yl. " " "
64	100KΩ	½	URD-097	BTS-100K	Br.-Blk.-Yl. Tone Comp.
65	47KΩ	½	URD-089	BTS-47K	Yl.-Vi.-Or. RF Filter
66	100KΩ	½	URD-097	BTS-100K	Br.-Blk.-Yl. Tone Comp.
67	6.8 Meg.	½	URD-141	BTS-6.8 Meg.	Blue-Gray-Grn. AF Grid
68	470KΩ	½	URD-113	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
69	470KΩ	½	URD-113	BTS-470K	Yl.-Vi.-Yl. Output Grid
70	150Ω	1	URE-029	BW-1-150	Br.-Grn.-Br. Output Cathode
71	470Ω	1	URE-041	BTA-470	Yl.-Vi.-Br. Filter
72	470Ω	1	URE-041	BTA-470	Yl.-Vi.-Br. "
73	18Ω	1	RRW-008	BW-1-18	Surge Limiter
74	330Ω	½	URD-037	BW-½-330	Or.-Or.-Br. Dial Light Shunt

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		GENERAL ELECTRIC PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.1	PRI.	SEC.1					
75	2150Ω	3.6Ω	200Ω	.6Ω	RTO-049				
		SEC.2		SEC.2 .1Ω					

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			GENERAL ELECTRIC PART No.	JENSEN PART No.	QUAM PART No.	
76	FIELD	VC IMP.	UOP-557	ST-105† Mod. P5-X	52A1†	†Drill and tap magnet frame and trim flange.
	PM	3.6Ω				
77	CONE DIA.	VC DIA.				
	5-3/16"	9/16"				

DATE 12/45-#4821-B

SET #51-FOLDER #8

FOR ALTERNATE METHOD OF ALIGNMENT SEE PAGE 4

ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use freq. modulated signal with 60 ∿ modulation. For AM IF use 40KC sweep, for FM IF use 600KC sweep. Connect the synchronized sweep voltage from the sig. gen. to the horizontal input of the scope. The horizontal sweep voltage may be taken from the power line if sig. gen. does not have a sync. voltage output. There may be some phase shift encountered between sig. gen. and scope horizontal sweep resulting in a double trace pattern. If provision is made for this in the scope or sig. gen. rotate phase control until the two curves coincide. If no provision is made for this, or synchronizing voltage is taken from power line, the same thing may be accomplished by inserting a capacitor of suitable value (.01 to .1 MFD) in series with the horizontal synchronizing input.

Leads from sig. gen. must be dressed back and away from all aligned stages to prevent regeneration and consequent misalignment.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1	.01 MFD.	High side to Pin 7 (grid) of 12BE6. Low side to chassis.	455KC (Freq. mod. 60 ∿ mod. 40KC sweep)	BC (Clock-wise)	Tuning cap. fully closed	Vertical input to Point Ⓓ. Ground to chassis.	A1,A2, A3,A4	Adjust for maximum amplitude and symmetry of pattern per Fig. 1.
2	.01 MFD	High side to Pin 1 (grid) of 6BJ6 RF Tube (1). Low side to chassis.	10.7MC (Freq. mod. 600 KC sweep)	FM (Counter clock-wise)	Tuning cap. fully open.	Vertical input in series with 200K Ω resistor to Point Ⓐ. Ground to chassis	A5,A6, A7,A8	Connect an 8 to 10 MFD. cap. from Point Ⓓ to chassis. Adjust A5 thru A8 for maximum amplitude and symmetry of pattern per Fig. 2.
3	.01 MFD	High side to Pin 1 (grid) of 12BE6. Low side to chassis. (Unsolder copper strap connecting Pin 7 to A15 at Pin 7 of 12BE6).	"	"	"	"	A9,A10	Adjust for maximum amplitude and symmetry of pattern per Fig. 2. Reconnect copper strap to Pin 7 of 12BE6.
4	.01 MFD	High side to Pin 1 (grid) of 6BJ6 2nd IF Tube (3). Low side to chassis.	"	"	"	Vertical input to Point Ⓒ. Ground to chassis.	A11, A12	Alternately adjust A11 for maximum amplitude and straightness of diagonal line and A12 for centering of pattern per Fig. 3 on scope horizontal sweep line.
5		Loop	1500KC (40KC sweep)	BC	1500KC	Vertical input to Point Ⓓ. Ground to chassis.	A13	Adjust to center pattern of Fig. 1 on scope screen.
6		"	"	"	Tune to center pattern on scope screen.	"	A14	Adjust for maximum amplitude of pattern per Fig. 1.
7	300Ω	High side to ungrounded FM ant. terminal. Low side to chassis. (Line antenna disconnected)	108MC (Freq. mod. 600 KC sweep)	FM	Tuning cap. fully open.	Vertical input in series with 200 KΩ resistor to Point Ⓐ. Ground to chassis.	A15	Adjust to center pattern of Fig. 2 on scope screen. Remove 8-10 MFD cap. from Point B
8	"	"	"	"	Tune to center pattern of Fig. 2. on scope screen.	"	A16	Rock tuning cap. to keep pattern centered on scope screen and adjust A16 for max. amplitude of pattern per Fig. 2.
9	300Ω	"	10.7MC	"	Tuning cap. fully closed	"	A17	Adjust for minimum amplitude of pattern per Fig. 2.

FIG. 1

FIG. 2

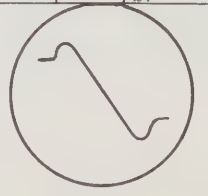


FIG. 3

GEN. ELECT. MODEL
210, 211, 212

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

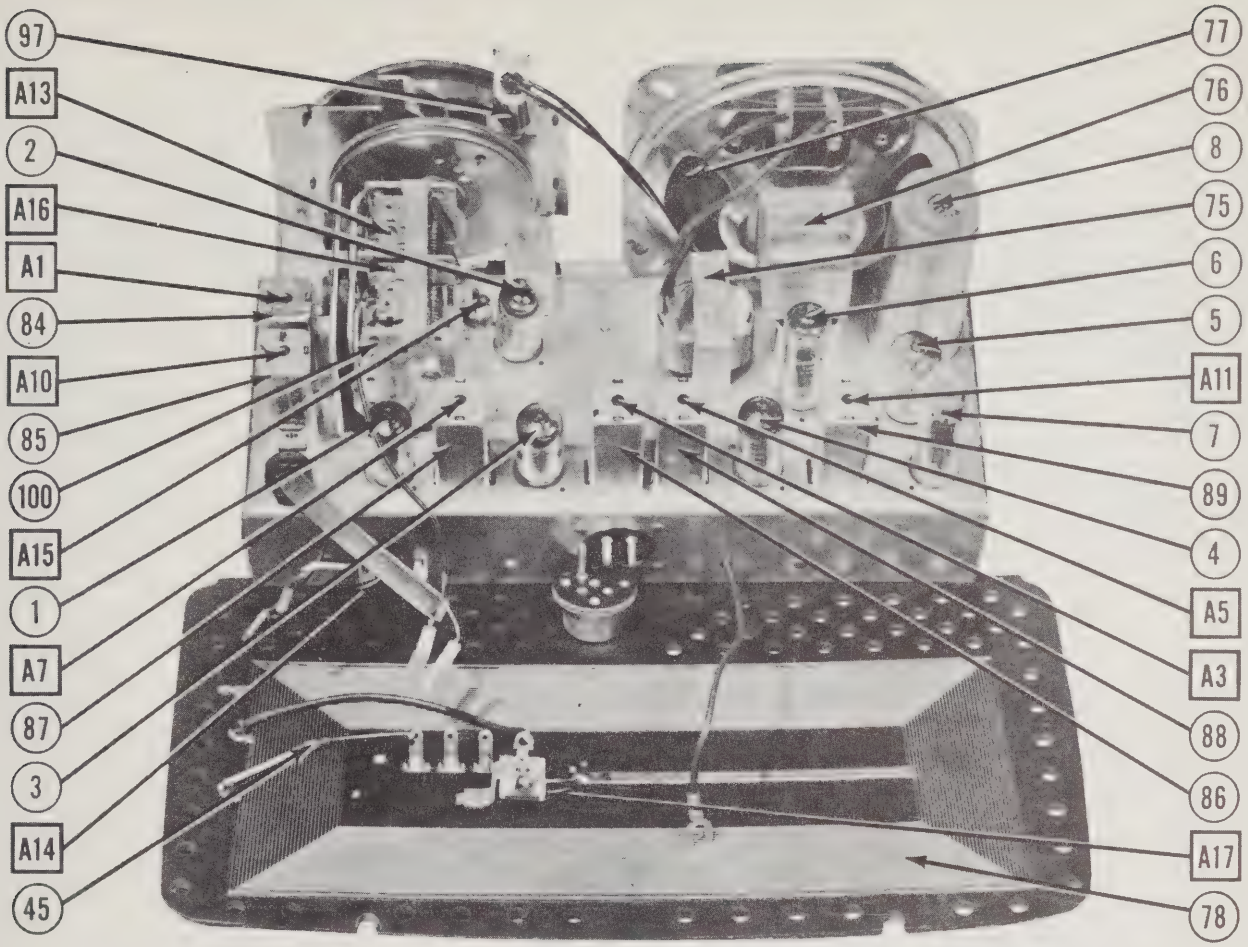
The AM-RF Alignment must be completed before FM-RF Alignment is attempted.
To set pointer turn tuning cap. fully closed and set pointer parallel with base of dial.
Use isolation transformer if available. If not, connect a .1 MFD. capacitor in series with low side of signal generator and chassis.
Use insulated alignment screwdriver for all adjustments.

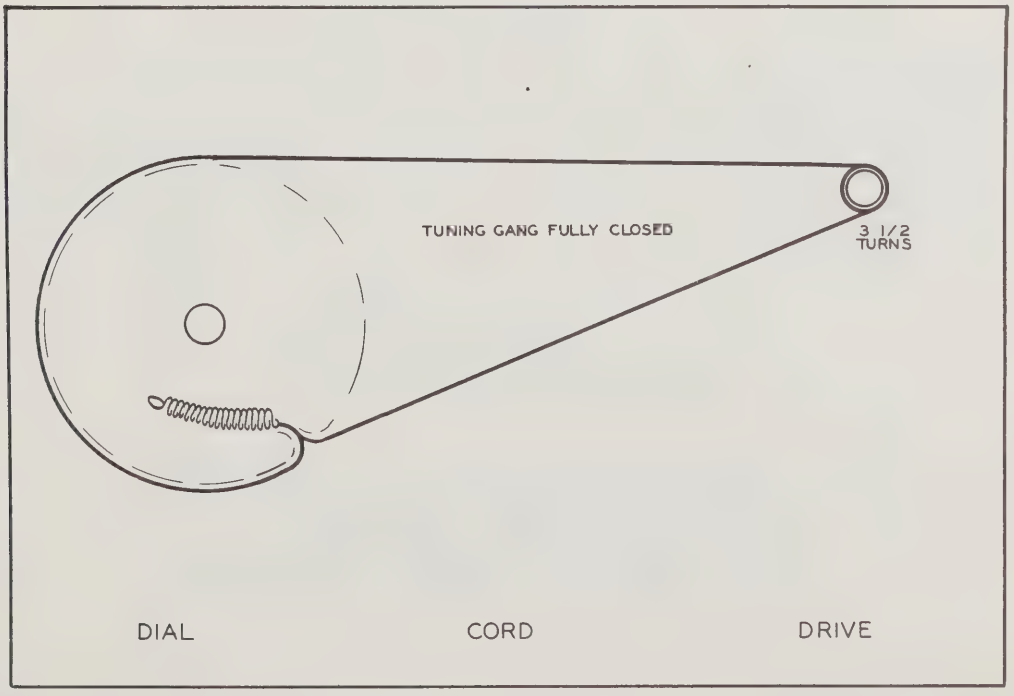
ALIGNMENT USING AM SIGNAL GENERATOR, VTVM & OUTPUT METER

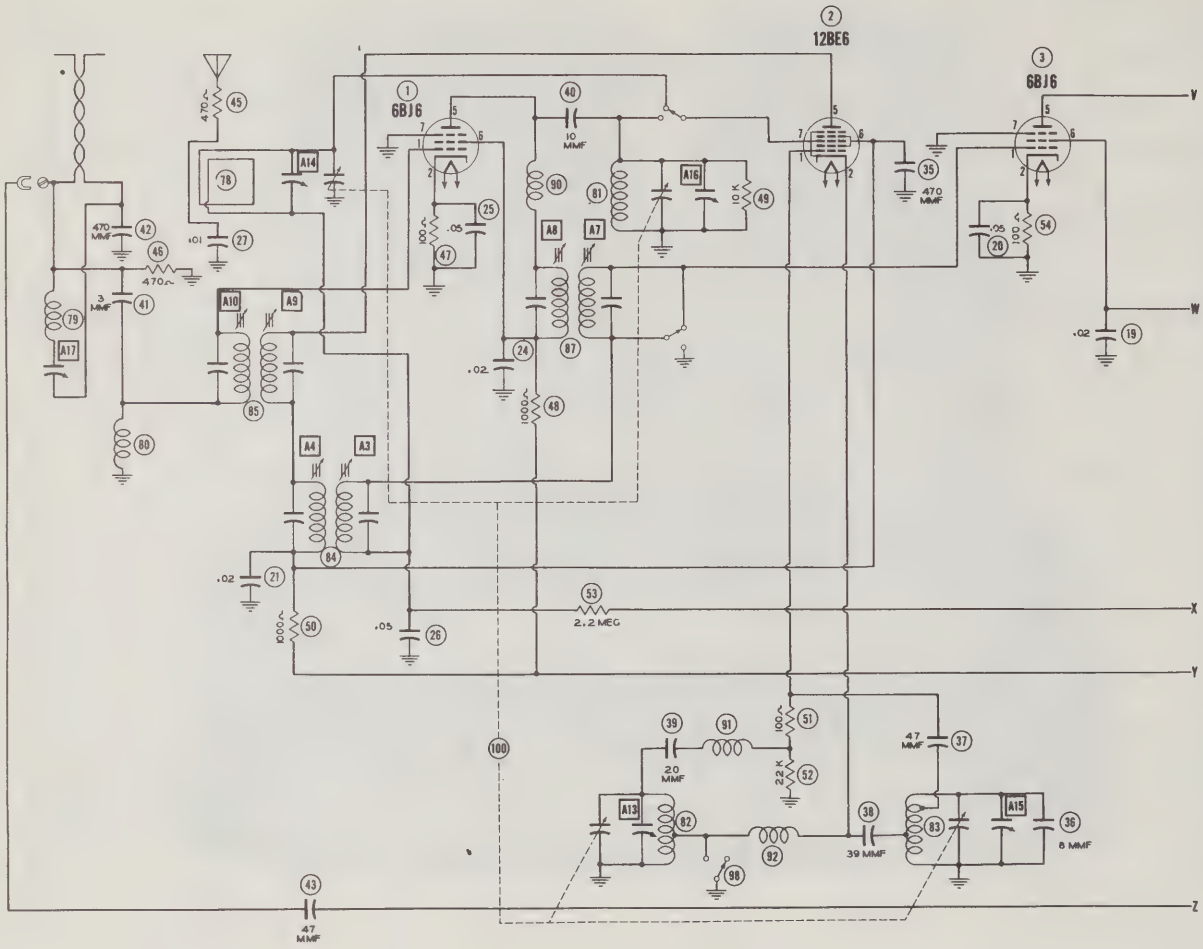
If VTVM is not available, a 20,000Ω/volt DC voltmeter may be used.
The 200KΩ resistor in series with the VTVM should be connected (preferably soldered) directly at Point (A) .to reduce capacity loading and to isolate the VTVM from the IF signal. The lead from the sig. gen. must be dressed away from any previously aligned stages to prevent regeneration and consequent misalignment.
In Steps 2 thru 4 attenuate sig. gen. output to maintain meter reading of not more than 1 volt.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01 MFD.	High side to Pin 7 (grid) of 12BE6. Low side to chassis.	455KC	BC (Clockwise)	Tuning cap. fully closed	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
						CONNECT VTVM		
2	.01 MFD.	High side to Pin 1 (grid) of 6BJ6 RF Tube (1). Low side to chassis.	10.7MC (Unmodulated)	FM (Counter clockwise)	Tuning cap. fully open	DC probe in series with 200K Ω res. to Point (A). Common to Point (B). (See pre-alignment notes)	A5, A6, A7, A8	Adjust for maximum deflection.
3	.01 MFD.	High side to Pin 1 (grid) of 12BE6. Low side to chassis. (Unsolder copper strap from Pin 7 of 12BE6.	"	"	"	"	A9, A10	Adjust for maximum deflection. Resolder copper strap to Pin 7 of 12BE6.
						OUTPUT METER		
4	.01 MFD	High side to Pin 1 (grid) of 6BJ6 2nd IF Tube (3). Low side to chassis.	10.7MC (Unmodulated)	FM (Counter clockwise)	Tuning cap. fully open.	Across voice coil	A11	Adjust for minimum audio output. Three minimum points will be noticed. (The center one is correct). Adjustment of A11 on either side of correct one will increase the output.
						CONNECT VTVM		
5	.01 MFD	High side to Pin 1 (grid) of 6BJ6 2nd IF Tube (3). Low side to chassis.	Detune sig. gen. to weakest of two peaks found in Step 4, one on each side of 10.7MC	FM (Counter clockwise)	Tuning cap. fully open.	DC probe to Point (C). Common to chassis	A12	Adjust for maximum deflection. Repeat Steps 4 & 5 until no further improvement can be made.
						OUTPUT METER		
6		Loop	1500KC (400 ~ modulation)	BC	1500KC	Across voice coil	A13	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Position of radiation loop in relation to loop of receiver must not be changed during this or following step.
7		"	"	"	Tune for maximum output.	"	A14	Adjust for maximum output. Repeat Steps 7 & 8 until no further improvement can be made.
						CONNECT VTVM		
8	300Ω carbon res.	High side to ungrounded FM ant. terminal. Low side to chassis. (Line antenna disconnected)	108MC (Unmodulated)	FM	Tuning cap. fully open.	DC probe in series with 200K Ω res. to Point (A). Common to Point (B).	A15	Adjust for maximum deflection.
9	"	"	98MC (Unmodulated)	"	Tune for maximum deflection.	"	A16	Rock tuning cap. and adjust for maximum deflection.
10	"	"	10.7MC (Unmodulated)	"	Tuning cap. fully closed	"	A17	Adjust for minimum deflection.

FOR ALTERNATE METHOD OF ALIGNMENT SEE PAGE 3


97
A13
2
A16
A1
84
A10
85
100
A15
1
A7
87
3
A14
45
77
76
8
75
6
5
A11
7
89
4
A5
A3
88
86
A17
78


TUNING GANG FULLY CLOSED
3 1/2
TURNS
DIAL
CORD
DRIVE



VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
‡	1	6BJ6	0V.	.9VDC	32VAC	38VAC	75VDC	75VDC	0V.	-	-
‡	2	12BE6	-.3VDC§	0V.	38VAC	50VAC	75VDC	75VDC	0V.	-	-
‡	3	6BJ6	0V.	1VDC	32VAC	25VAC	75VDC	75VDC	0V.	-	-
‡	4	6BH6	52VDC	45VDC	25VAC	16VAC	85VDC	85VDC	55VDC	-	-
‡	5A	19T8	-.9VDC	-1VDC	-.2VDC	0V.	16VAC	37VDC	0V.	-.7VDC	40VDC
	5B	19T8	-.9VDC	-2.4VDC	4.2VDC	0V.	19VAC	37VDC	0V.	-.7VDC	40VDC
‡	6	35B5	0V.	5.4VDC	50VAC	80VAC	102VDC	97VDC	0V.	-	-
‡	7	35W4	0V.	0V.	80VAC	117VAC	107VAC	107VAC	110VDC	-	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
‡	1	6BJ6	.7Ω	100Ω	32Ω	36Ω	42KΩ	42KΩ	0Ω	-	-
‡	2	12BE6	22KΩ	0Ω	38Ω	50Ω	40KΩ	40KΩ	0Ω	-	-
‡	3	6BJ6	.6Ω	100Ω	32Ω	25Ω	42KΩ	42KΩ	0Ω	-	-
‡	4	6BH6	700KΩ	33KΩ	25Ω	19Ω	65KΩ	65KΩ	33KΩ	-	-
‡	5A	19T8	120KΩ	120KΩ	240KΩ	0Ω	19Ω	220KΩ	0Ω	6.8 Meg.	510KΩ
	5B	19T8	120KΩ	120KΩ	240KΩ	0Ω	19Ω	220KΩ	0Ω	6.8 Meg.	510KΩ
‡	6	35B5	470KΩ	150Ω	50Ω	80Ω	40KΩ	40KΩ	INF.	-	-
‡	7	35W4	INF.	INF.	80Ω	115Ω	105Ω	105Ω	40KΩ	-	-

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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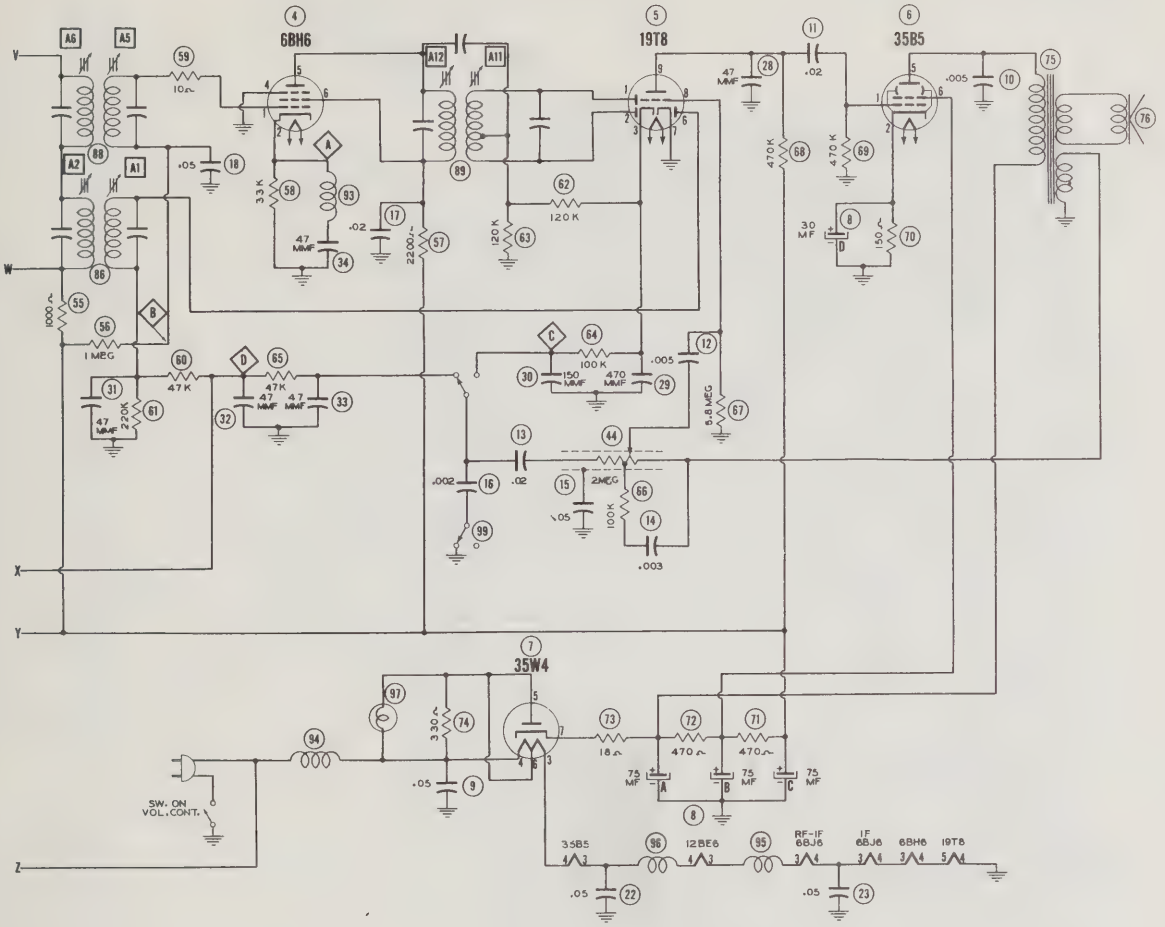

IF=455 KC AM

IF=10.7 MC FM

STAGE GAIN MEASUREMENTS		
ANTENNA TO CONVERTER GRID	3X	600KC
CONVERSION GAIN	10X	IN 600KC OUT 455KC
INPUT IF TRANSFORMER	1x	455KC
IF TUBE	250X	455KC
OUTPUT IF TRANSFORMER	.4X	400 ∿
AUDIO	35X	400 ∿
OUTPUT	15X	400 ∿

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

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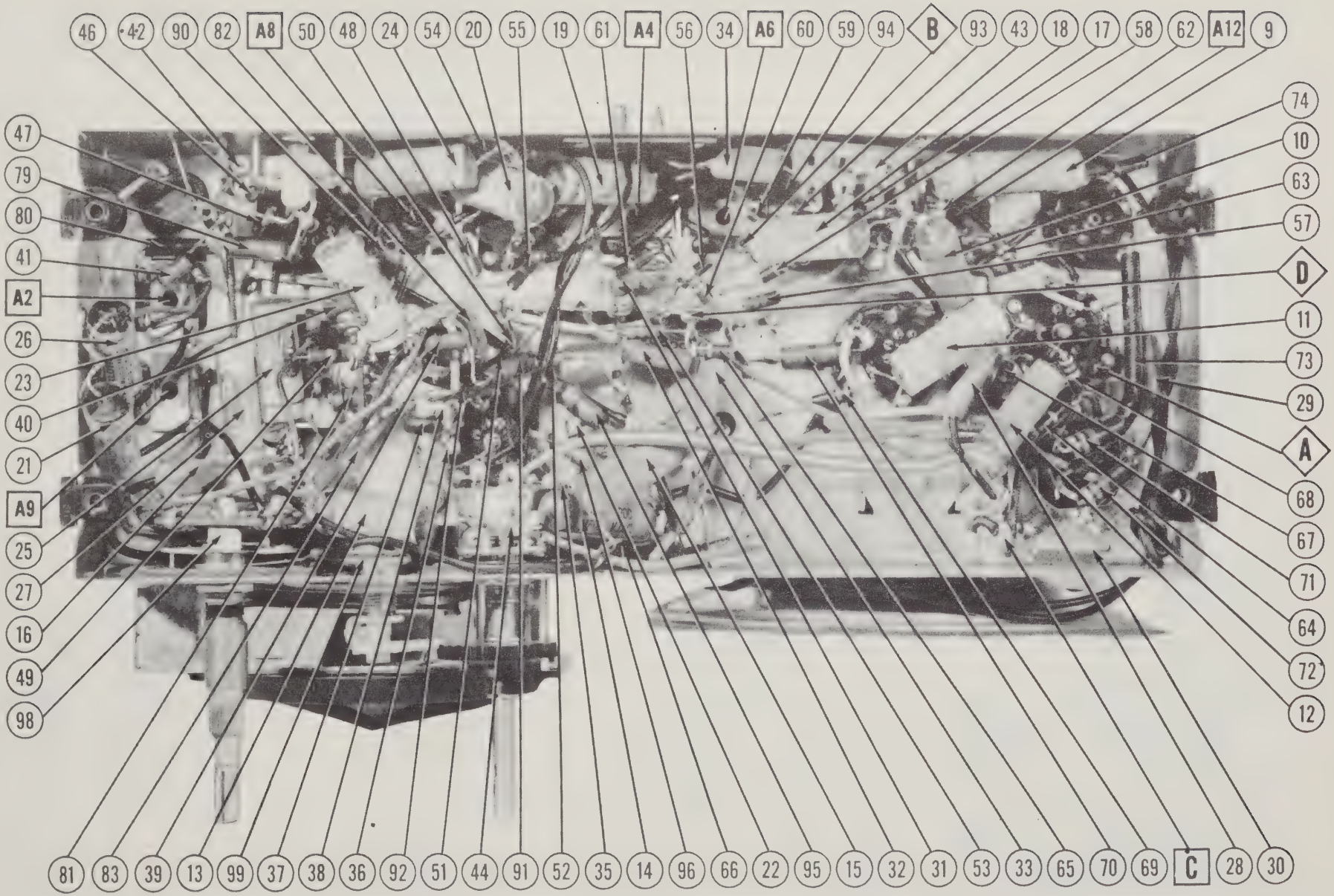
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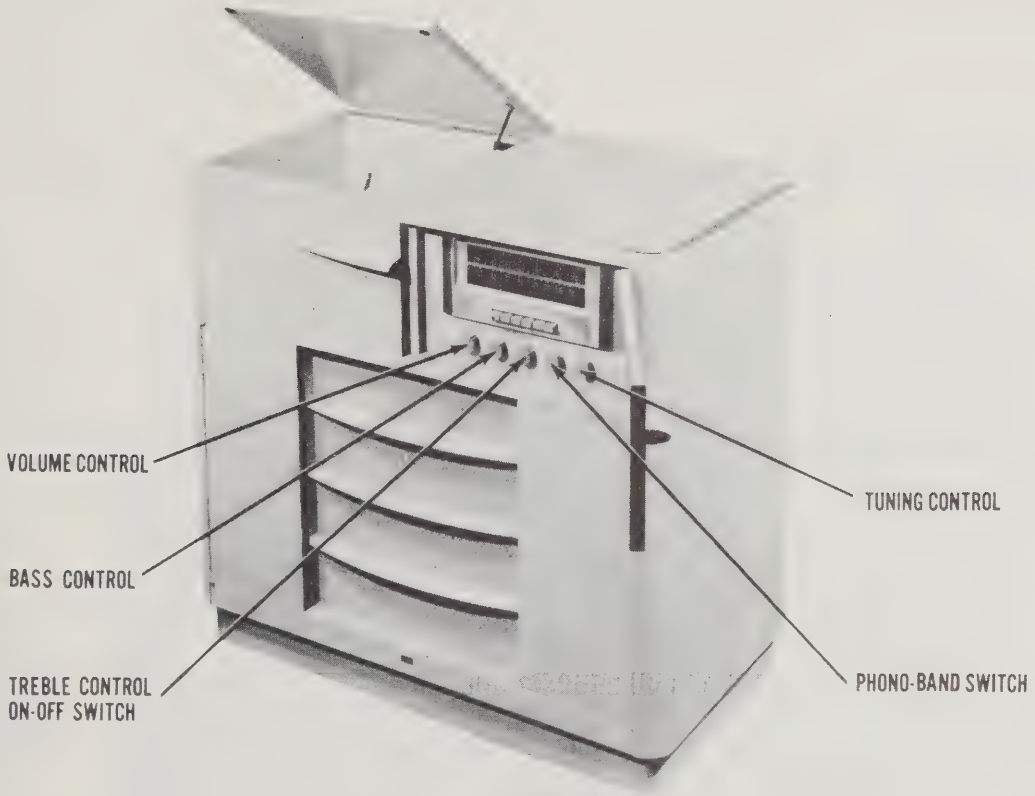
74 10 63 57 D 11 73 29 A 68 67 71 64 72 12
47 79 80 41 A2 26 23 40 21 A9 25 27 16 49 98
81 83 39 13 99 37 38 36 92 51 44 91 52 35 14 96 66 22 95 15 32 31 53 33 65 70 69 C 28 30

HOFFMAN MODELS
C-502, C-512



HOFFMAN MODELS
C-502, C-512

HOFFMAN MODEL C-502

TRADE NAME	Hoffman, Models C-502, C-512		
MANUFACTURER	Hoffman Radio Corp., 3761 S. Hill St., Los Angeles, Calif.		
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Antenna		
TUBES (FIFTEEN)	Types, 6BA6 RF Amp., 6BE6 Mixer, 6C4 Oscillator, 6BA6 1st IF Amp., 6BA6 2nd IF Amp., 6AL5 Ratio Det., 6AT6 AM-Det.-AVC-AF, 6SJ7 AF Amp., 6J5 Tone Amp., 6J5 Phase Inv., (4) 6K6GT Power Output, 5U4G Rectifier.		
POWER SUPPLY	110-120 Volts AC	RATING	1.65 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	535-1650KC	FM	88 - 108MC

PUSHBUTTON ADJUSTMENTS

The ranges of the five pushbuttons in order from left to right are as follows:

550-890KC, 550-890KC, 890KC-1570KC, 890-1570KC and 1000-1740KC.

1. Turn set on and allow it to warm up for at least fifteen minutes.
2. Make up a list of stations desired to be set up, making sure that each station falls within the range of its button.
3. Depress "dial" button and manually tune in first station selected.
4. Depress first button and adjust B1 to tune in selected station.
5. Adjust B2 for maximum volume.
6. Follow the procedure outlined above to set up the remaining buttons.

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 7, Indiana

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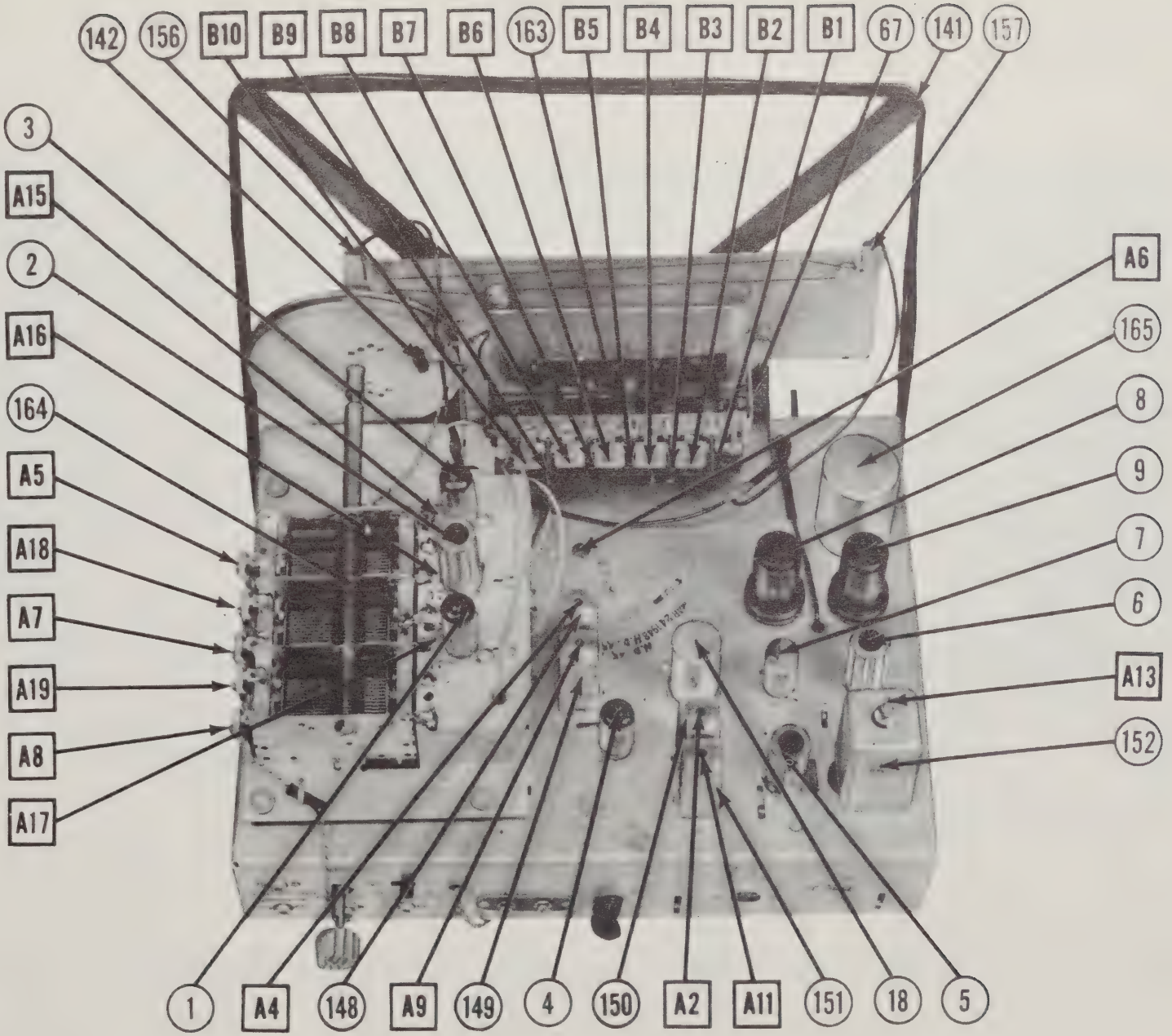
DATE 12/48-#4821-9 SET #51-FOLDER #9


142
156
B10
B9
B8
B7
B6
163
B5
B4
B3
B2
B1
67
141
157
3
A15
2
A16
164
A5
A18
A7
A19
A8
A17
A6
165
8
9
7
6
A13
152
1
A4
148
A9
149
4
150
A2
A11
151
18
5

HOFFMAN MODELS C-502, C-512

PAGE 3

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: HOFFMAN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6BA6	6BA6	7BK	
2	Mixer	6BE6	6BE6	7CH	
3	Oscillator	6C4	6C4	6BG	
4	1st IF Amp.	6BA6	6BA6	7BK	
5	2nd IF Amp.	6BA6	6BA6	7BK	
6	Ratio Det.	6AL5	6AL5	6BT	
7	AM Det.-AVC-AF	6AT6	6AT6	7BT	
8	AF Amp.	6SJ7	6SJ7	8N	
9	Tone Amp.	6J5	6J5	6Q	
10	Phase Inv.	6J5	6J5	6Q	
11	Power Output	6K6GT	6K6GT	7S	
12	" "	6K6GT	6K6GT	7S	
13	" "	6K6GT	6K6GT	7S	
14	" "	6K6GT	6K6GT	7S	
15	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HOFFMAN PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
16A	20	450	4200	AF44J4A	UP2245C	DY-312	EL-350	■ Filter
B	20	450						▲ "
C	20	25						Cathode Bypass
17	10	450		PRS450/10	BR1045	M-10-450	UT-12	Inverter Plate Decoup.
18	20	450	4207	AF4J	UP2045	DY-20-450	EL-2	Decoupling
19	100	25		PRS25/100	BRH251	M-100-25	UHC-102	AF Cathode Bypass
20	5	50	4209	PRS150/4	BR550	M-4-450	TA-5	Stabalizing Cap.
21	.01	600		484-01	DT6S1	ST-6-01	TC-11	Line Filter
22	.01	600		484-01	DT6S1	ST-6-01	TC-11	" "
23	.001	600	4104	484-001	DT6D1	ST-6-001	TC-21	Output Plate Bypass
24	.001	600	4104	484-001	DT6D1	ST-6-001	TC-21	" "
25	.05	400	4101	484-05	DT4S5	ST-4-05	TC-15	Audio Coupling
26	.05	400	4101	484-05	DT4S5	ST-4-05	TC-15	" "
27	.01	400	4112	484-01	DT4S1	ST-4-01	TC-11	" "
28	.005	600	4102	684-005	DT6D5	ST-6-005	TC-25	" " -Note 1
29	.05	400	4101	484-05	DT4S5	ST-4-05	TC-15	" " " "
30	.5	400		484-.5	DT4P5	ST-4-5	TC-5	Tone Compensation
31	.01	400	4112	484-01	DT4S1	ST-4-01	TC-11	" "
32	.005	600	4102	684-005	DT6D5	ST-6-005	TC-25	" "
33	.01	400	4112	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
34	.05	400	4101	484-05	DT4S5	ST-4-05	TC-15	AF Screen Byp.-Note 1
35	.05	400	4101	484-05	DT4S5	ST-4-05	TC-15	Audio Coupling
36	.002	600	4118	684-002	DT6D2	ST-6-002	TC-22	De-emphasis
37	.001	600	4104	684-001	DT6D1	ST-6-001	TC-21	2nd IF Screen Bypass
38	.01	400	4112	484-01	DT4S1	ST-4-01	TC-11	RF Bypass Pwr. Supply
39	.01	400	4112	484-01	DT4S1	ST-4-01	TC-11	1st IF Decoupling
40	.001	600	4104	684-001	DT6D1	ST-6-001	TC-21	1st IF Screen Byp.
41	.05	400	4101	484-05	DT4S5	ST-4-05	TC-15	1st IF Fil. Bypass
42	.05	200	4100	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
43	.05	200	4100	484-05	DT2S5	ST-4-05	TC-15	" "
44	.05	200	4100	484-05	DT2S5	ST-4-05	TC-15	" "
45	.01	400	4112	484-01	DT4S1	ST-4-01	TC-11	RF Decoupling
46	330	300	4010	1468-0003	5W5T3	MO.5-33	1FM-33	Tone Compensation-Cer.
47	330	300	4010	1468-0003	5W5T3	MO.5-33	1FM-33	" " "
48	100	300	4012	1468-0001	5W5T1	MO.5-31	1FM-31	" " "
49	650	300	4011	1468-00075	1W5T7	MO.3-37	1FM-37	" " "
50	47	500		1468-00005	5W5Q5	MO.5-45	1FM-45	" " - -Note1
51	100	300	4012	1468-0001	5W5T1	MO.5-31	1FM-31	AM Diode RF Filter-Cer.
52	330	300	4010	1469-0003	5R5T3	MOS.5-33	MS-33	Diode Load Cap.-Cer.- Note 2
53	330	300	4010	1469-0003	5R5T3	MOS.5-33	MS-33	"
54	330	300	4010	1468-0003	5W5T3	MO.5-33	1FM-33	RF Bypass -Cer.
55	5000	300	4029	1467-005	1D5D5	MW.5-25	1FM-25	2nd IF Decoup. "
56	5000	300	4029	1467-005	1D5D5	MW.5-25	1FM-25	Mixer Decoupling "
57	470	500	4003	1468-0005	5W5T5	MO.5-35	1FM-35	Mixer Screen Byp.
58	220	300	4026	1468-0002	5W5T2	MO.5-32	1FM-32	Mixer Cath. Byp. "
59	100	300	4012	1469-0001	5R5T1	MOS.5-31	MS-31	Osc. Feedback "
60	22	300	4021	1469-00002	5R5Q2	MOS.5-42	MS-42	Osc. Grid Cap. "

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: HOFFMAN PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
108	220KΩ	½		BTS-220K	Red-Red-Yl. Isolation-See Note 1
109	220KΩ	½		BTS-220K	Red-Red-Yl. " " " "
110	2200Ω	½	4512	BTS-2200	Red-Red-Red AF Cathode
111	220KΩ	½	4500	BTS-220K	Red-Red-Yl. AF Plate Load
112	120KΩ	½	4548	BTS-120K	Br.-Red-Yl. AF Screen Dropping-See Note 5
113	15KΩ	½	4521	BTS-15K	Br.-Grn.-Or. AF Screen Bleeder- " " "
114	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AF Screen " " "
115	1 Meg.	½	4513	BTS-1 Meg.	Br.-Blk.-Grn. Tone Amp. Grid
116	2200Ω	½	4512	BTS-2200	Red-Red-Red Tone Amp. Cathode
117	22KΩ	½	4501	BTS-22K	Red-Red-Or. Tone Amp. Cathode
118	22KΩ	½	4501	BTS-22K	Red-Red-Or. Tone Amp. Plate Load
119	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AF Voltage Divider-See Note 1
120	100KΩ	½		BTS-100K	Br.-Blk.-Yl. AF Voltage Divider-See Note 1
121	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue Pillow Speaker Amp. Grid-See Note 1
122	47KΩ	½		BTS-47K	Yl.-Vi.-Or. Pillow Speaker Amp. Plate Load-See Note 1
123	3000Ω	½		BTS-3300	Or.-Blk.-Red Tone Compensation
124	1 Meg.	½	4513	BTS-1 Meg.	Br.-Blk.-Grn. Driver Grid
125	2200Ω	½	4512	BTS-2200	Red-Red-Red Driver Cathode
126	47KΩ	½	4559	BTS-47K	Yl.-Vi.-Or. Driver Cathoce
127	47KΩ	½	4559	BTS-47K	Yl.-Vi.-Or. Driver Plate Load
128	10KΩ	½		BTS-10K	Br.-Blk.-Or. Driver Plate Decoup.-See Note 1
129	220KΩ	½	4500	BTS-220K	Red-Red-Yl. Output Grid
130	220KΩ	½	4500	BTS-220K	Red-Red-Yl. " "
131	220Ω	3	4706	ABA-250	Red-Red-Br. Output Cathode-See Note 6
132	1500Ω	10		AB-1500	Filter-See Note 1
133	10KΩ	2	4503	BT-2-10K	Br.-Blk.-Or. Bleeder
134	10KΩ	2	4503	BT-2-10K	Br.-Blk.-Or. "
135	10KΩ	2	4503	BT-2-10K	Br.-Blk.-Or. "

Note 1-Not used in all models.
Note 3-In some models, Items 89 and 90 are replaced by Item 88.
Note 4-Some models use 22KΩ ½ W. Part #4501 in this application.
Note 5-In some Model, Items 112 & 113 are replaced by Item #114.
Note 6-On IRC replacement set slider 220Ω from end.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: HOFFMAN PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDARSON PART No.	REPLACEMENT DATA: MERIT PART No.
136	117V AC @ 1.35A	940V CT @ .16A DC	5.2V AC @ 3.0A	6.6V AC @ 4.7A	5007		T22R35*	P-3156*

*Drill new mounting holes.

FILTER CHOKE

ITEM NO.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D.C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA: HOFFMAN PART NO.	REPLACEMENT DATA: STANCOR PART NO.	REPLACEMENT DATA: THORDARSON PART NO.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
137	.15A	96Ω	5.5 Henries	5116		T20C55	C-3196*	*Drill new mounting holes.

BASS BOOST CHOKE

ITEM NO.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D.C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA: HOFFMAN PART NO.	REPLACEMENT DATA: STANCOR PART NO.	REPLACEMENT DATA: THORDARSON PART NO.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
165		12Ω	3.7 Henries	5103				

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	HOFFMAN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
61	50	300	4023	1469-00005	5R5Q5	MOS.5-45	MS-45	Fixed Trimmer -Cer.
62	50	300	4031	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Feedback "
63	100	300	4012	1469-0001	5R5T1	MOS.5-31	MS-31	Fixed Trimmer "
64	100	300	4012	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling "
65	470	300	4003	1468-0005	5W5T5	MO.5-35	1FM-35	RF Screen Bypass "
66	100	300	4012	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling "
67	500	500	4004	1469-0005	5R5T5	MOS.5-35	MS-35	Fixed Trimmer

Note 1-Not used in all models.
Note 2-When either Item #52 or #53 are replaced, replace both with capacitors of equal value.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	HOFFMAN PART No.	IRC PART No.	CLAROSTAT PART No.	
68A	500KΩ	½	4804	D13-133	M-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 68A per instructions
69A	50KΩ	½	4806	D11-123	M-44-S	Bass Control
B	Shaft		Not Req.	A	Not Req.	Attach to 69A per instructions
70A	250KΩ	½	4805	D13-130	M-64-Z	Treble Control
B	Shaft		Not Req.	A	Not Req.	Attach to 70A per instructions
C	Switch		" "	41	SW-A	" " " " "
71A	500KΩ	½	4804	D13-133	M-60-Z	Mike Control
B	Shaft		Not Req.	A	Not Req.	Attach to 71A per instructions

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	HOFFMAN PART No.	IRC PART No.	
72	56Ω	½	4561		Grn.-Blue-Blk. RF Cathode
73	270KΩ	½	4545	BTS-270K	Red-V1.-Yl. RF Grid
74	33KΩ	1	4556	BTA-33K	Or.-Or.-Or. RF Screen
75	1500Ω	½	4534	BTS-1500	Br.-Grn.-Red RF Decoupling
76	100KΩ	½	4511	BTS-100K	Br.-Blk.-Yl. AVC Network
77	100KΩ	½	4511	BTS-100K	Br.-Blk.-Yl. " "
78	22KΩ	½	4501	BTS-22K	Red-Red-Or. Osc. Grid
79	4700Ω	2	4541	BT-2-4700	Yl.-V1.-Red Decoupling
80	22Ω	½	4560		Red-Red-Blk. Parasitic Suppressor
81	56Ω	½	4561		Grn.-Blue-Blk. Mixer Cathode
82	33KΩ	1	4556	BTA-33K	Or.-Or.-Or. Mixer Screen
83	1500Ω	½	4534	BTS-1500	Br.-Grn.-Red Mixer Decoup.
84	56Ω	½	4561		Grn.-Blue-Blk. 1st IF Cathode
85	33KΩ	1	4556	BTA-33K	Or.-Or.-Or. 1st IF Screen
86	1500Ω	½	4534	BTS-1500	Br.-Grn.-Red 1st IF Decoupling
87	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Diode Filter
88	680KΩ	½	4555	BTS-680K	Blue-Gray-Yl. Diode Load-See Note 3
89	100KΩ	½		BTS-100K	Br.-Blk.-Yl. " " " " "
90	47KΩ	½		BTS-47K	Yl.-V1.-Or. " " " " "
91	2.2 Meg.	½	4502	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
92	1 Meg.	½	4513	BTS-1 Meg.	Br.-Blk.-Grn. Tone Compensation-See Note 1
93	56Ω	½	4561		Grn.-Blue-Blk. 2nd IF Cathode
94	33KΩ	1	4556	BTA-33K	Or.-Or.-Or. 2nd IF Screen
95	1500Ω	½	4534	BTS-1500	Br.-Grn.-Red 2nd IF Decoup.
96	120Ω	½	4546		Br.-Red-Br. RF Filter
97	47KΩ	½	4501	BTS-47K	Yl.-V1.-Or. De-emphasis-See Note 4
98	330Ω	½	4549		Or.-White-Br. Neutralizing Resistor
99	390Ω	½	4549		Or.-White-Br. " "
100	6800Ω	½	4557	BTS-6800	Blue-Gray-Red Ratio Det. Diode Load
101	6800Ω	½	4557	BTS-6800	Blue-Gray-Red " " " "
102	470KΩ	½	4506	BTS-470K	Yl.-V1.-Yl. AVC Network
103	470KΩ	½		BTS-470K	Yl.-V1.-Yl. Phono Shunt-See Note 1
104	47KΩ	½	4550	BTS-47K	Yl.-V1.-Or. Tone Compensation
105	22KΩ	½	4538	BTS-27K	Red-V1.-Or. " "
106	47KΩ	½	4550	BTS-47K	Yl.-V1.-Or. " "
107	4.7 Meg.	½	4544	BTS-4.7 Meg.	Yl.-V1.-Grn. " "

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		HOFFMAN PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
138	9000Ω	4Ω	450Ω	.3Ω	5108	A-3870	T22S56	A-2904‡	‡Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			HOFFMAN PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-102†		†Replace output transformer to match 6-8Ω voice coil.
139	PM	4Ω	9015	Mod. P12-S	12A6†	
	CONE DIA.	VC DIA.				
140	11-7/16"	1"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	HOFFMAN PART No.	MEISSNER PART No.
141	Loop Ant.	.2Ω	.2Ω	55210	
142	Loop Load. Coil		4.4Ω	5265	
143	Ant. Coil FM		0Ω	5253	
144	RF Coil BC	1Ω	7.9Ω	5264	
145	" " FM		0Ω	5252	
146	Osc.Coil BC		5.7Ω	5263	
147	" " FM		0Ω	5251	
148	1st IF AM	12Ω	12Ω	5276	
149	" " FM	1Ω	.4Ω	5274	
150	2nd IF AM	12Ω	12Ω	5277	
151	" " FM	1.2Ω	.4Ω	5275	
152	FM Det.Tran.	1.9Ω	.1Ω	5278	
153	RF Plate Choke		2.3Ω	5254	
154	Osc. Plate Choke		2.3Ω	5254	
155	Fil. Choke		0Ω	5266	

DIAL LIGHT

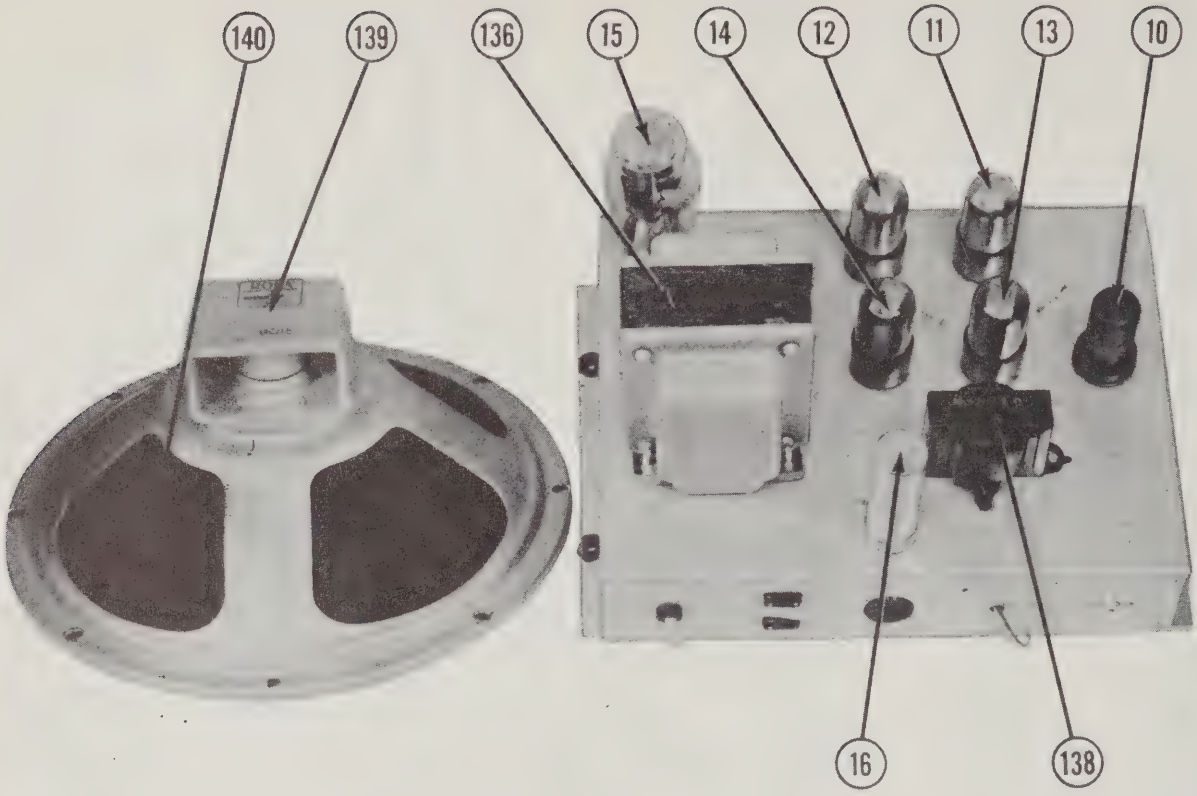
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					HOFFMAN PART No.		
156-158	Bayonet	6-8	0.25	Blue			Type #44

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA		REMARKS
	HOFFMAN PART No.	ASTATIC PART No.	
159		QT3-M	QT3-M Original Part

MISCELLANEOUS

ITEM No.	PART NAME	HOFFMAN PART No.	NOTES
160	Bandswitch	6014	(RF Section)
161	"	6015	(AF Section)
162	Switch		Pillow Speaker
163	Pushbutton Assy.	6004	
164	3 Gang Var. Cap.	4408	(20-480MMF, 20-480MMF, 20-345MMF)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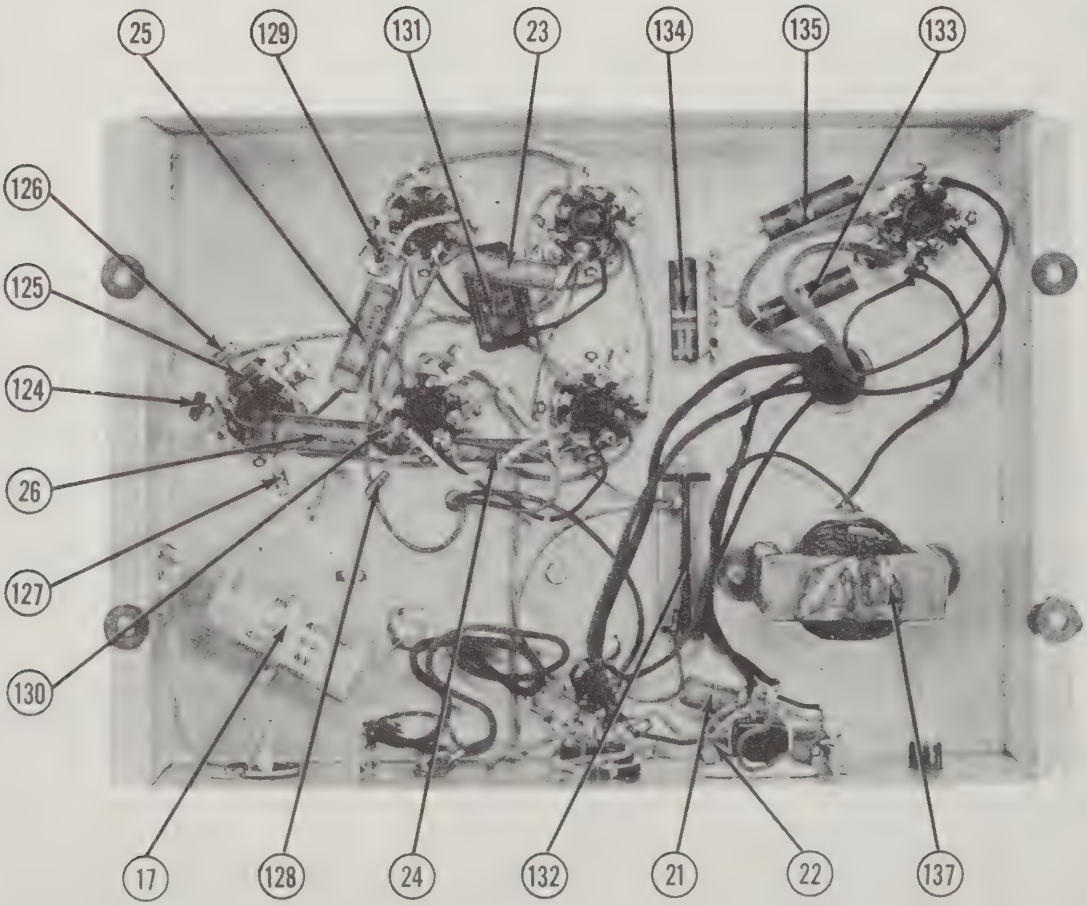
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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer turn tuning cap. fully closed and set pointer 1-3/4" from left edge of dial backplate. This is the calibration mark referred to in steps below.
AM alignment must be completed before FM alignment is attempted.
Use an insulated screwdriver for all adjustments.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to center AM stator of tuning cap. Low side to chassis.	455KC	AM (Center)	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output.
2	.1 MFD. in series with 400 Ω carbon resistor	High side to external ant. clip. Low side to chassis.	1650KC	"	"	"	A5	" " " "
3	"	"	535KC	"	Tuning cap. fully closed	"	A6	Adjust for maximum output. Repeat Steps 2 & 3 until no further improvement can be made.
4	"	"	1400KC	"	Tune for maximum output.	"	A7,A8	Adjust for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5	Directly	High side to center FM stator of tuning cap. Low side to chassis.	10.7MC (Unmodulated)	FM (Clockwise)	Tuning cap. fully open.	DC probe to Point (A). Common to chassis	A9,A10 A11,A12 A13	Solder a 5000Ω carbon resistor across secondary of 1st FM-IF Transformer (148). Solder another 5000Ω resistor across secondary of 2nd FM-IF Transformer (151). Adjust A9 thru A13 for maximum output. Attenuate output of sig. gen. to maintain meter reading of ½ to 1 volt.
6	Directly	"	"	"	"	DC probe to Point (B). Common to chassis	A14	Adjust for zero deflection. Remove the two 5000Ω resistors. Continue with FM-RF Alignment in Step 8.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5	.01 MFD	High side to Pin 1 (Grid) of 6BA6 1st IF Tube (4). Low side to chassis.	10.7MC (Freq. Mod.)	FM (Clockwise)	Tuning cap. fully open.	Vertical input to Point (A). Ground to chassis.	A13, A12, A11	Disconnect 5 MFD cap. (20) from Point (A). Adjust A13, A12, A11 for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
6	.01 MFD	High side to Pin #11 of sec. 2. Front of band switch. Low side to chassis.	"	"	"	"	A10,A9	Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1. Reconnect cap. (20) to Point (A).
7	.01 MFD.	High side to Pin 1 (grid) of 6BA6 1st IF Tube (4). Low side to chassis.	"	"	"	Vertical input to Point (B). Ground to chassis.	A14	Adjust for maximum straightness of crossover lines with crossover occurring at center of pattern per Fig. 2. Continue with FM-RF Alignment in Step 8.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8	2 150Ω carbon res.	Each side to FM ant. terminal. Low side to chassis.	100MC (Unmodulated)	FM	3-5/16" from calibration mark.	DC probe to Point (A). Common to chassis.	A15	Adjust for maximum deflection.
9	"	"	90MC (Unmodulated)	"	Tune for maximum deflection.	"	A16, A17	" " " "
10	"	"	106MC (Unmodulated)	"	"	"	A18, A19	Adjust for maximum deflection. Repeat Steps 8, 9 & 10 until no further improvement can be made.

FIG. 1

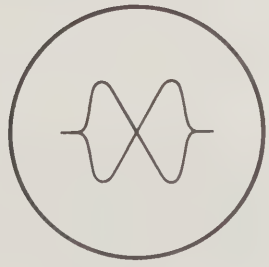
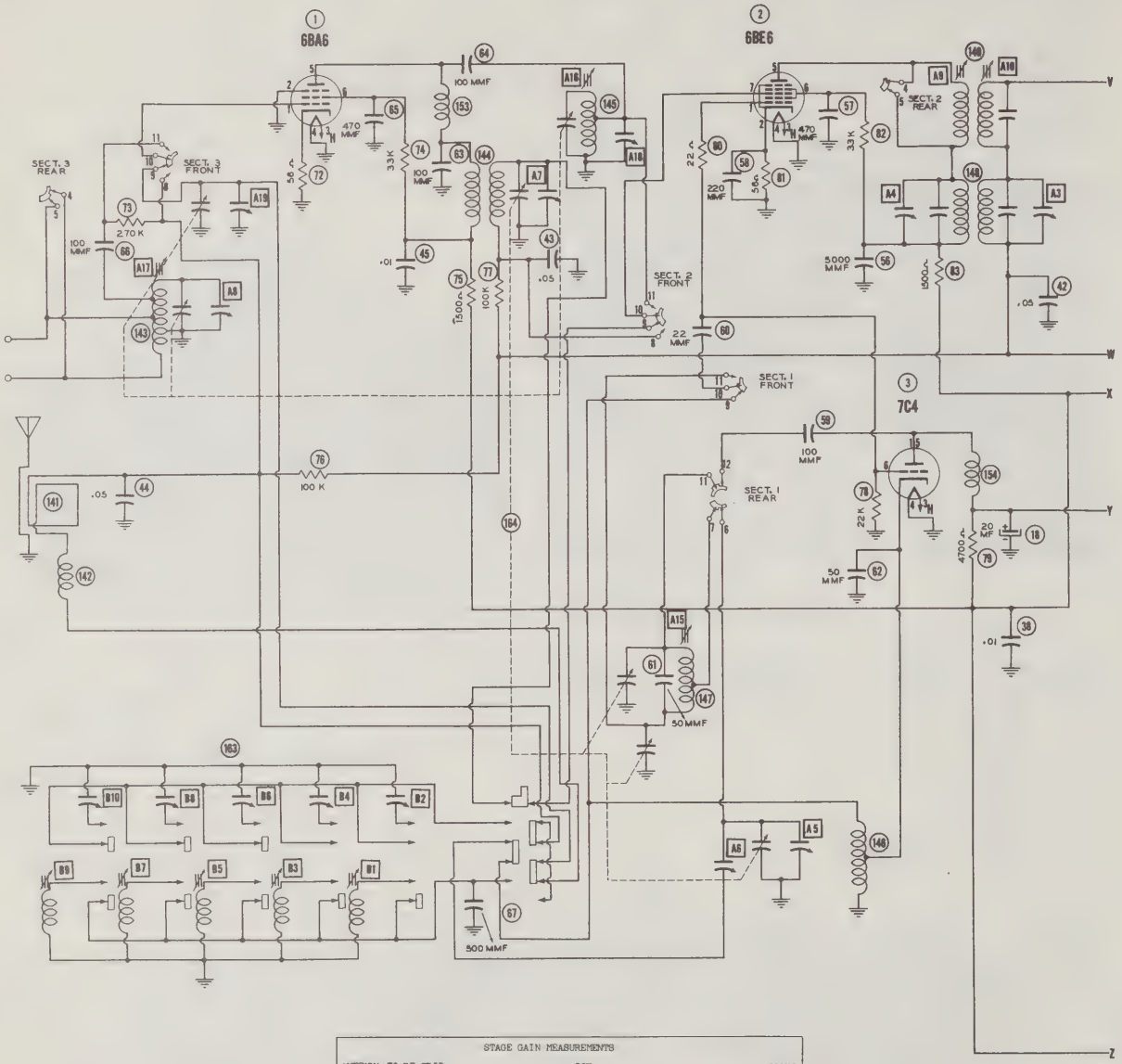


FIG. 2



STAGE GAIN MEASUREMENTS		
ANTENNA TO RF GRID	20X	600KC
RF GRID TO CONV. GRID	6X	600KC
CONVERSION GAIN	7X	IN 600KC
		OUT 455KC
INPUT IF TRANSFORMER	.7X	455KC
IF TUBE	150X	455KC
OUTPUT IF TRANSFORMER	.5X	455KC
AUDIO	100X	400 ∿
TONE AMP.	2X	400 ∿
PHASE INVERTER	.6X	400 ∿
OUTPUT	20X	400 ∿
PILLOW SPEAKER AMP.	30X	400 ∿

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

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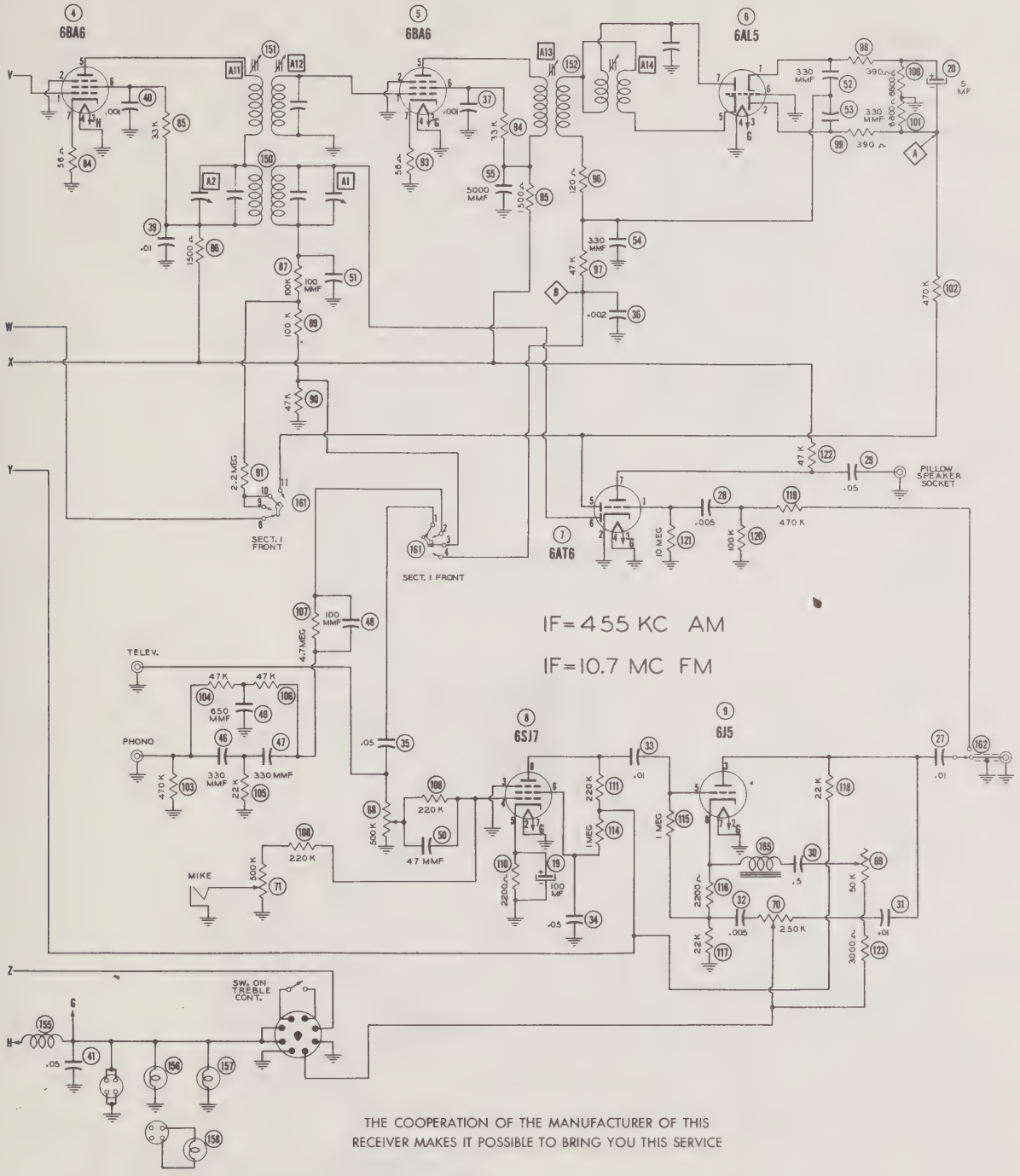

THE COOPERATION OF THE MANUFACTURER OF THIS
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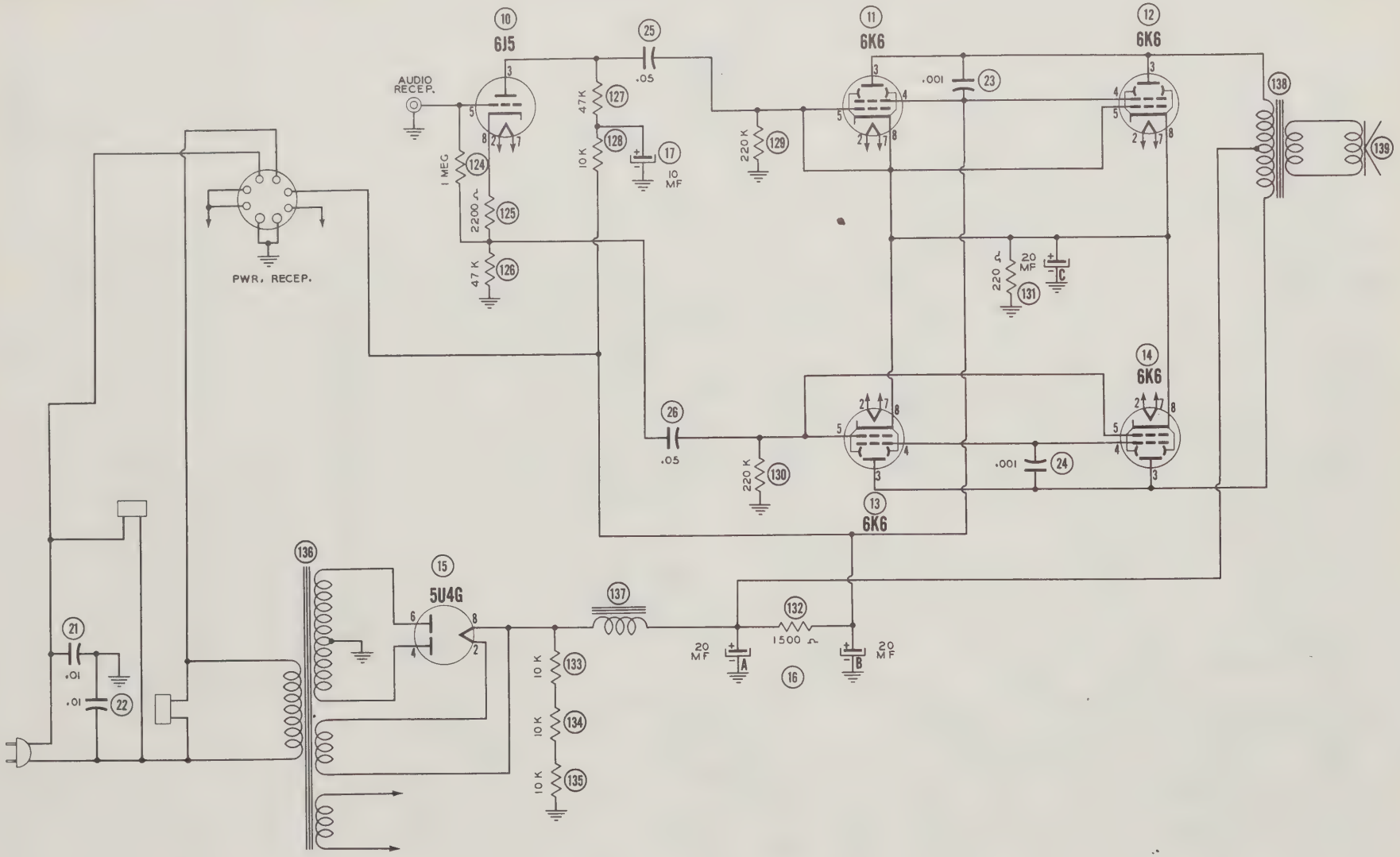

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VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

RADIO-PHONO SWITCH IN RADIO POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	-.2VDC	0V.	6.6VAC	0V.	215VDC	90VDC	1VDC	-
2	6BE6	-8VDC§	.4VDC	6.6VAC	0V.	230VDC	60VDC	-.2VDC	
3	6C4	175VDC	0V.	6.6VAC	0V.	175VDC	-7.8VDC§	0V.	-
4	6BA6	-.2VDC	0V.	6.6VAC	0V.	220VDC	85VDC	.8VDC	-
‡ 5	6BA6	0V.	0V.	6.6VAC	0V.	220VDC	90VDC	1VDC	-
‡ 6	6AL5	0V.	-.4VDC	6.6VAC	0V.	0V.	0V.	0V.	-
7	6AT6	-.4VDC	0V.	6.6VAC	0V.	-.2VDC	-.2VDC	100VDC	-
8	6SJ7	0V.	0V.	0V.	0V.	1.6VDC	40VDC	6.6VAC	45VDC
9	6J5	0V.	6.6VAC	130VDC	175VDC	1.4VDC	40VDC	0V.	45VDC
10	6J5	0V.	0V.	150VDC	0V.	2.2VDC	65VDC	6.6VAC	70VDC
11	6K6GT	0V.	0V.	330VDC	230VDC	0V.	0V.	6.6VAC	19VDC
12	6K6GT	0V.	0V.	330VDC	230VDC	0V.	0V.	6.6VAC	19VDC
13	6K6GT	0V.	0V.	330VDC	230VDC	0V.	0V.	6.6VAC	19VDC
14	6K6GT	0V.	0V.	330VDC	230VDC	0V.	0V.	6.6VAC	19VDC
15	5U4G	0V.	360VDC	0V.	470VAC	0V.	470VAC	0V.	360VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

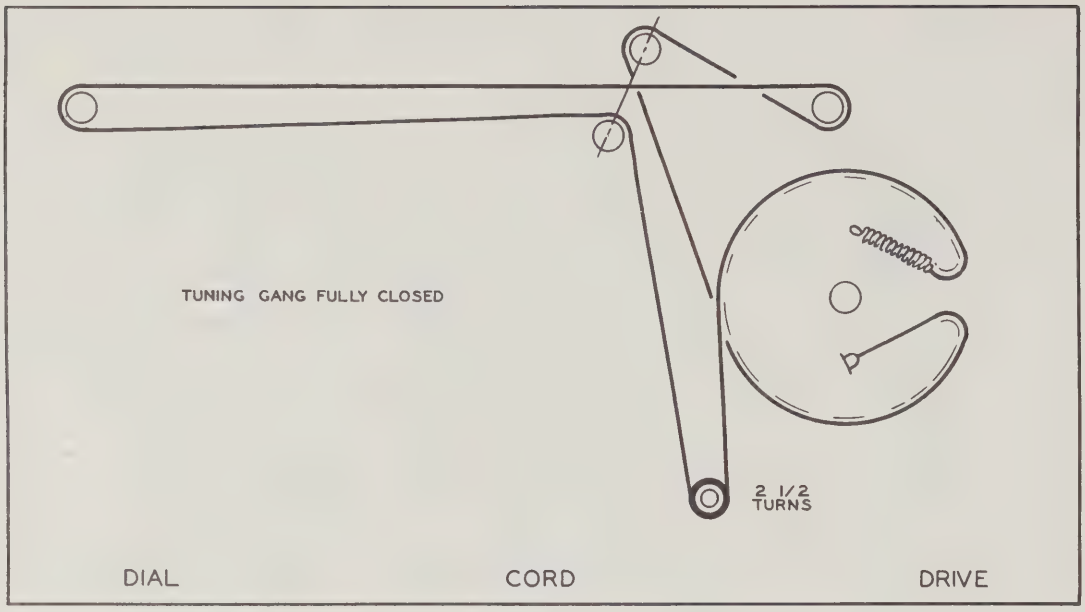
RESISTANCE READINGS

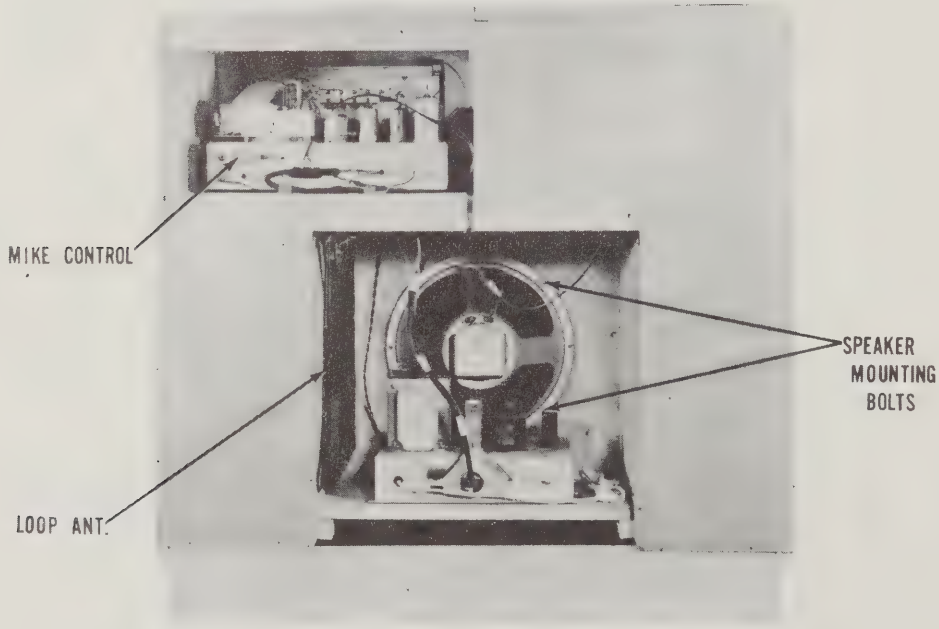
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6BA6	2.4 Meg.	0Ω	.1Ω	0Ω	32KΩ	65KΩ	56Ω	-
2	6BE6	22KΩ	56Ω	.1Ω	0Ω	32KΩ	65KΩ	2.4 Meg.	-
3	6C4	34KΩ	INF.	.1Ω	0Ω	34KΩ	22KΩ	2.8Ω	-
4	6BA6	2.3 Meg.	0Ω	.1Ω	0Ω	32KΩ	65KΩ	56Ω	-
‡ 5	6BA6	.4Ω	0Ω	.1Ω	0Ω	32KΩ	65KΩ	56Ω	-
‡ 6	6AL5	7KΩ	7KΩ	.1Ω	0Ω	INF.	0Ω	INF.	-
7	6AT6	10 Meg.	0Ω	.1Ω	0Ω	500KΩ	230KΩ	80KΩ	-
8	6SJ7	0Ω	0Ω	0Ω	500KΩ	2.2KΩ	1.1 Meg.	.1Ω	250KΩ
9	6J5	0Ω	.1Ω	60KΩ	30KΩ	1 Meg.	22KΩ	0Ω	24KΩ
10	6J5	0Ω	0Ω	90KΩ	INF.	1 Meg.	47KΩ	.1Ω	50KΩ
11	6K6GT	0Ω	0Ω	30KΩ	30KΩ	220KΩ	INF.	.1Ω	220Ω
12	6K6GT	0Ω	0Ω	30KΩ	30KΩ	220KΩ	INF.	.1Ω	220Ω
13	6K6GT	0Ω	0Ω	30KΩ	30KΩ	220KΩ	INF.	.1Ω	220Ω
14	6K6GT	0Ω	0Ω	30KΩ	30KΩ	220KΩ	INF.	.1Ω	220Ω
15	5U4G	INF.	30KΩ	INF.	120Ω	INF.	110Ω	INF.	30KΩ

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.





DISASSEMBLY INSTRUCTIONS

1. Remove five push-on type control knobs.
2. Remove phono-pickup plug from tuning chassis.
3. Remove loop antenna leads from loop antenna.
4. Remove FM antenna leads from terminal strip on rear of tuning chassis.
5. Remove audio plug from power supply chassis.
6. Remove power plug from power supply chassis.
7. Remove pilot light plug from rear of tuning chassis.
8. Remove loop antenna ground lead from clip on rear of tuning chassis.
9. Remove phono-motor plug from power supply chassis.
10. Remove speaker plugs from speaker.
11. Remove four machine screws holding tuning chassis in cabinet. Remove chassis from cabinet.
12. Remove four machine screws holding power supply chassis in cabinet.
13. Remove four machine screws holding speaker in cabinet. Remove speaker from cabinet.
14. Remove two wood screws holding loop antenna in cabinet. Remove loop from cabinet.

JEWEL MODEL 814
BATTERY OPERATED

JEWEL MODEL 814
BATTERY OPERATED

JEWEL MODEL 814

TRADE NAME	Jewel, Model 814
MANUFACTURER	Jewel Radio Corp., 583 Sixth Ave., New York,11, N.Y.
TYPE SET	Battery Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 1R5 Converter, 1T4 IF Amp., 1S5 Det.-AVC-AF, 3S4 Power Output
POWER SUPPLY	1.5 Volts "A" Supply and 67.5 Volts "B" Supply
RATING	245MA @ 1.5 Volts DC and 12MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540-1630KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 6 (grid) of 1R5. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output.
2		Loop	1630KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1400KC	Tune for maximum output.	"	A6	Adjust for maximum output.

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DATE 12/48-#4821-10 SET #51-FOLDER #10

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		JEWEL PART No.	STANDARD REPLACEMENT		
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1T4	1T4	6AR	
3	Det.-AVC-AF	1S5	1S5	6AU	
4	Power Output	3S4	3S4	7BA	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	JEWEL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
5	8	150		PRS150-8	BR815	M-8-150	UT-81	Power Supply Bypass
6	.005	150		484-005	ZNW4D5	TST-2-006	68P30	Output Plate Bypass
7	.005	150		484-005	ZNW4D5	TST-2-006	68P30	Audio Coupling
8	.005	150		484-005	ZNW4D5	TST-2-006	68P30	" "
9	.03	150			ZNW1S3	TST-2-02	68P34	AF Screen Bypass
10	.03	150			ZNW1S3	TST-2-02	68P34	Screen Decoupling
11	.02	200		484-02	GT2S2	TST-2-02	68P34	RF Bypass Pwr. Supply-Note
12	.02	200		484-02	GT2S2	TST-2-02	68P34	AVC Filter
13	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass
14	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter

Note-Not used in all models.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	JEWEL PART No.	IRC PART No.	CLAROSTAT PART No.	
15A	1 Meg.	½	50-12	D13-137	AM-63-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 15A per instructions
C	Switch		" "	42	SW-A2	" " " " "

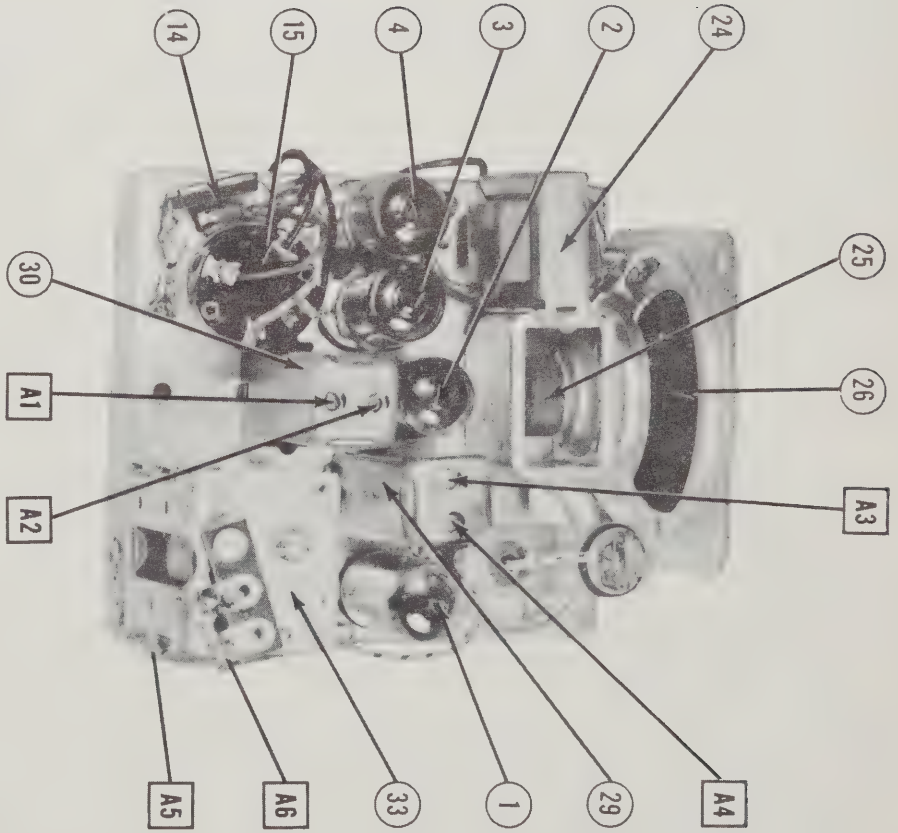
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	JEWEL PART No.	IRC PART No.	
16	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Oscillator Grid
17	3 Meg.	½		BTS-3.3 Meg.	Or.-Blk.-Grn. AVC Network
18	10KΩ	½		BTS-10K	Br.-Blk.-Or. Screen Decoupling
19	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
20	4.7 Meg.	½		BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Screen Dropping
21	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. AF Plate Load
22	3.3 Meg.	½		BTS-3.3 Meg.	Or.-Or.-Grn. Output Grid
23	470Ω	½		BTS-470	Yl.-Vi.-Br. Bias

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		JEWEL PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
24	5800Ω	3.4Ω	240Ω	.3Ω	Part of 80-11	A-3328#		A-2998#	#Bend mounting tabs down, file out slots and mount on original bracket.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			JEWEL PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.				
25	PM	3.4Ω	80-11			
	CONE DIA.	VC DIA.				
26	2-15/16"	9/16"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	JEWEL PART No.	MEISSNER PART No.	
27	Loop Ant.		3Ω			
28	Osc. Coil	2.5Ω	8Ω			
29	Input IF	21Ω	20Ω		16-6668	
30	Output IF	21	20Ω		16-6669	

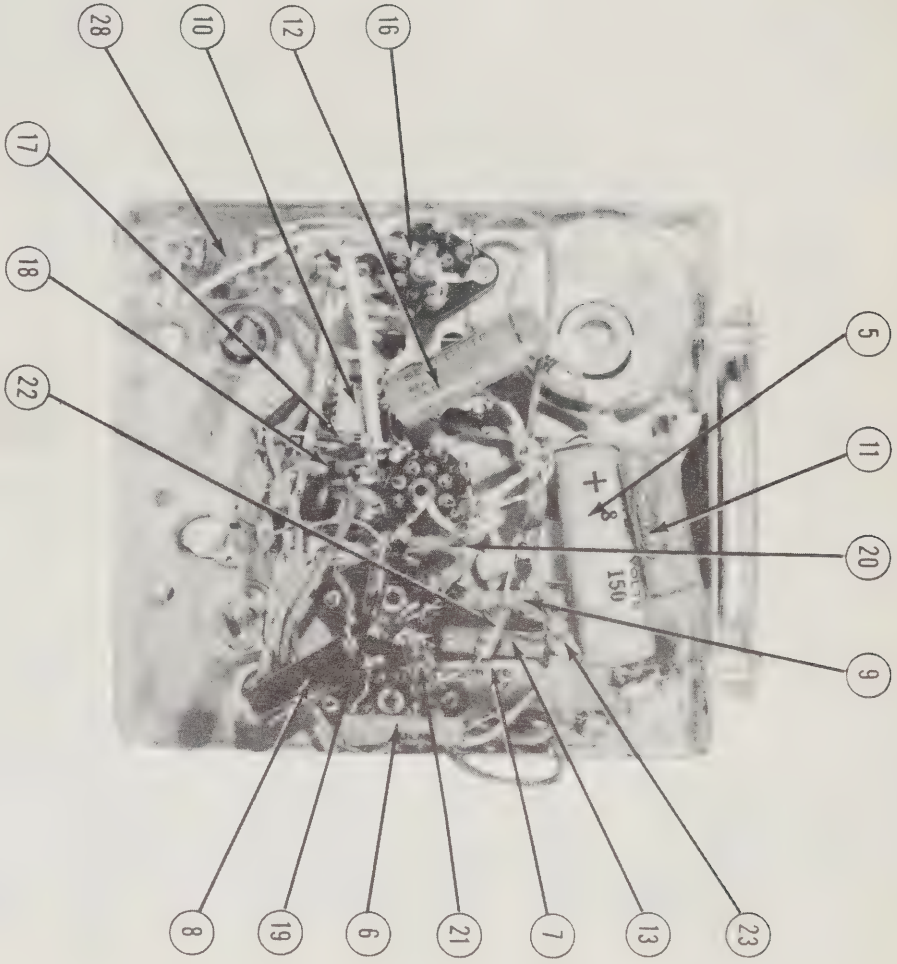
BATTERIES

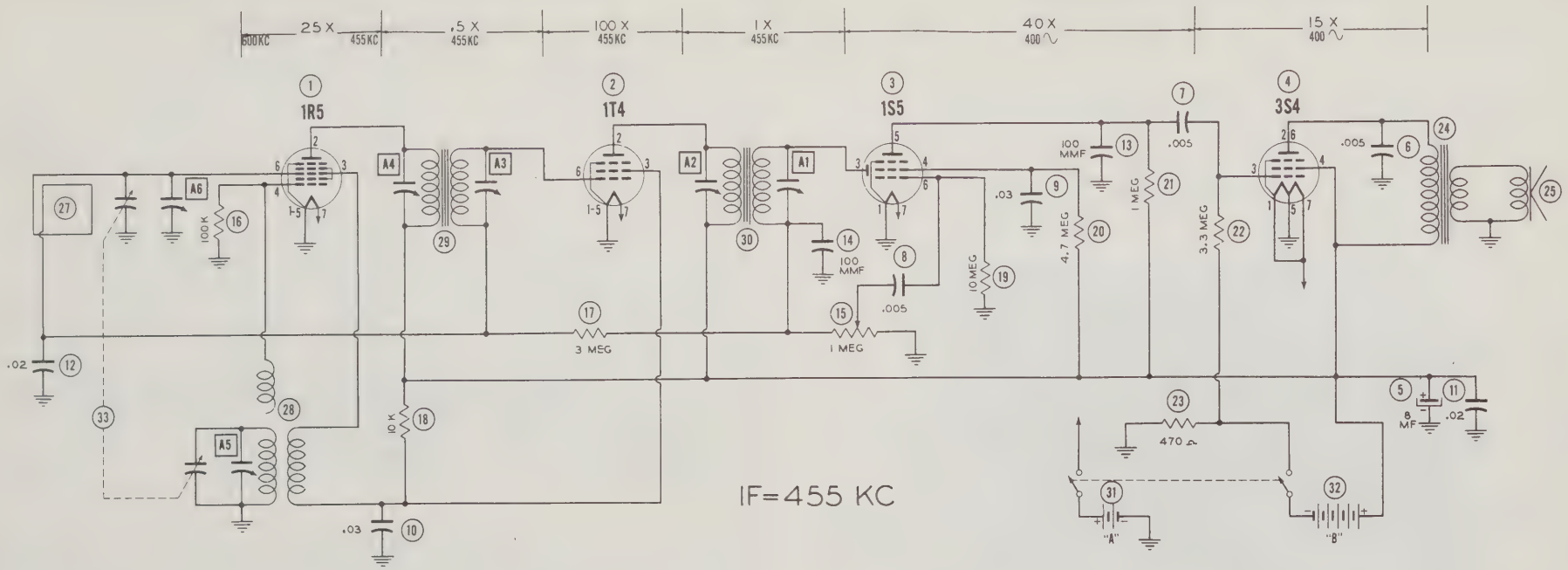
ITEM No.	VOLTAGE	JEWEL PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
31	1.5V "A"		950			2R			
32	67.5V"B"			467			XX45		

MISCELLANEOUS

ITEM No.	PART NAME	JEWEL PART No.	NOTES
33	2 Gang Var. Cap		(26-302MMF, 23-148MMF)

CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	0V.	64VDC	43VDC	-8.4VDC§	0V.	0V.	1.4VDC
2	1T4	0V.	64VDC	43VDC	0V.	0V.	0V.	1.4VDC
3	1S5	0V.	0V.	-.3VDC	2.6VDC	6.3VDC	0V.	1.4VDC
4	3S4	1.4VDC	62VDC	0V.	64VDC	0V.	62VDC	1.4VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	0Ω	80KΩ	90KΩ	100KΩ	0Ω	4.3 Meg.	*
2	1T4	0Ω	80KΩ	90KΩ	3.3 Meg.	0Ω	4.3 Meg.	*
3	1S5	0Ω	INF.	1 Meg.	4.8 Meg.	1.1 Meg.	10 Meg.	*
4	3S4	*	80KΩ	3.3 Meg.	80KΩ	0Ω	80KΩ	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4821-10

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC to chassis.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.

LEARADIO CHASSIS MODEL R-971

TRADE NAME	Learadio, Chassis Model R-971
MANUFACTURER	Lear, Inc., 110 Ionia Ave., N.W., Grand Rapids, Mich.
TYPE SET	AM-FM Superheterodyne Tuner
TUBES (TEN)	Types, 6BA6 AM RF Amp., 12AT7 AM-FM Mixer, 12AT7 AM-FM Osc., 6BA6 AM IF Amp., 6AU6 FM 1st IF Amp., 6BA6 FM 2nd IF Amp., 6BA6 FM 3rd IF Amp., 6AL5 FM Ratio Det., 6BF6 AM Det.-AVC-AF, 6AL7GT Tuning Eye.
POWER SUPPLY	Power Chassis such as Learadio Model A471
TUNING RANGE-BROADCAST	540-1620KC FREQ. MOD. 88-108MC

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.
RADIO-PHONO SWITCH IN RADIO POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6BA6	-.2VDC	0V.	6.7VAC	0V.	240VDC	70VDC	.8VDC	-	-
2A	12AT7	240VDC	0V.	6.9VDC	6.7VAC	6.7VAC	-.4VDC	-.9VDC	0V.	0V.
‡ 2B	12AT7	0V.	-1VDC	0V.	6.7VAC	6.7VAC	270VDC	-1.9VDC	0V.	0V.
3A	12AT7	280VDC	-17.5VDC§	0V.	6.7VAC	6.7VAC	0V.	-.7VDC§	0V.	0V.
‡ 3B	12AT7	0V.	-.6VDC§	0V.	6.7VAC	6.7VAC	220VDC	-11.5VDC§	0V.	0V.
4	6BA6	0V.	0V.	6.7VAC	0V.	280VDC	120VDC	1.8VDC	-	-
‡ 5	6AU6	-1.4VDC	0V.	6.7VAC	0V.	260VDC	140VDC	0V.	-	-
‡ 6	6BA6	0V.	0V.	6.7VAC	0V.	240VDC	100VDC	1.4VDC	-	-
‡ 7	6BA6	0V.	0V.	6.7VAC	0V.	240VDC	100VDC	1.2VDC	-	-
‡ 8	6AL5	.4VDC	-.4VDC	6.7VAC	0V.	0V.	0V.	.2VDC	-	-
9	6BF6	3.4VDC	22VDC	6.7VAC	0V.	200VDC	0V.	110VDC	-	-
10	6AL7GT	-	-	-	-	-	-	-	-	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6BA6	360KΩ	0Ω	.1Ω	0Ω	44KΩ	100KΩ	68Ω	-	-
2A	12AT7	44KΩ	1 Meg.	2.2KΩ	.1Ω	.1Ω	INF.	470KΩ	0Ω	0Ω
‡ 2B	12AT7	INF.	1 Meg.	2.2KΩ	.1Ω	.1Ω	44KΩ	470KΩ	0Ω	0Ω
3A	12AT7	44KΩ	22KΩ	5Ω	.1Ω	.1Ω	INF.	22KΩ	0Ω	0Ω
‡ 3B	12AT7	INF.	22KΩ	5Ω	.1Ω	.1Ω	44KΩ	22KΩ	0Ω	0Ω
4	6BA6	2.2 Meg.	0Ω	.1Ω	0Ω	40KΩ	80KΩ	100Ω	-	-
‡ 5	6AU6	2.2 Meg.	0Ω	.1Ω	0Ω	44KΩ	100KΩ	0Ω	-	-
‡ 6	6BA6	470KΩ	0Ω	.1Ω	0Ω	44KΩ	80KΩ	100Ω	-	-
‡ 7	6BA6	2.2 Meg.	0Ω	.1Ω	0Ω	44KΩ	80KΩ	68Ω	-	-
‡ 8	6AL5	15KΩ	15KΩ	.1Ω	0Ω	INF.	0Ω	INF.	-	-
9	6BF6	100KΩ	9.4KΩ	.1Ω	0Ω	250KΩ	2.5 Meg.	180KΩ	-	-
10	6AL7GT	-	-	-	-	-	-	-	-	-

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 7, Indiana

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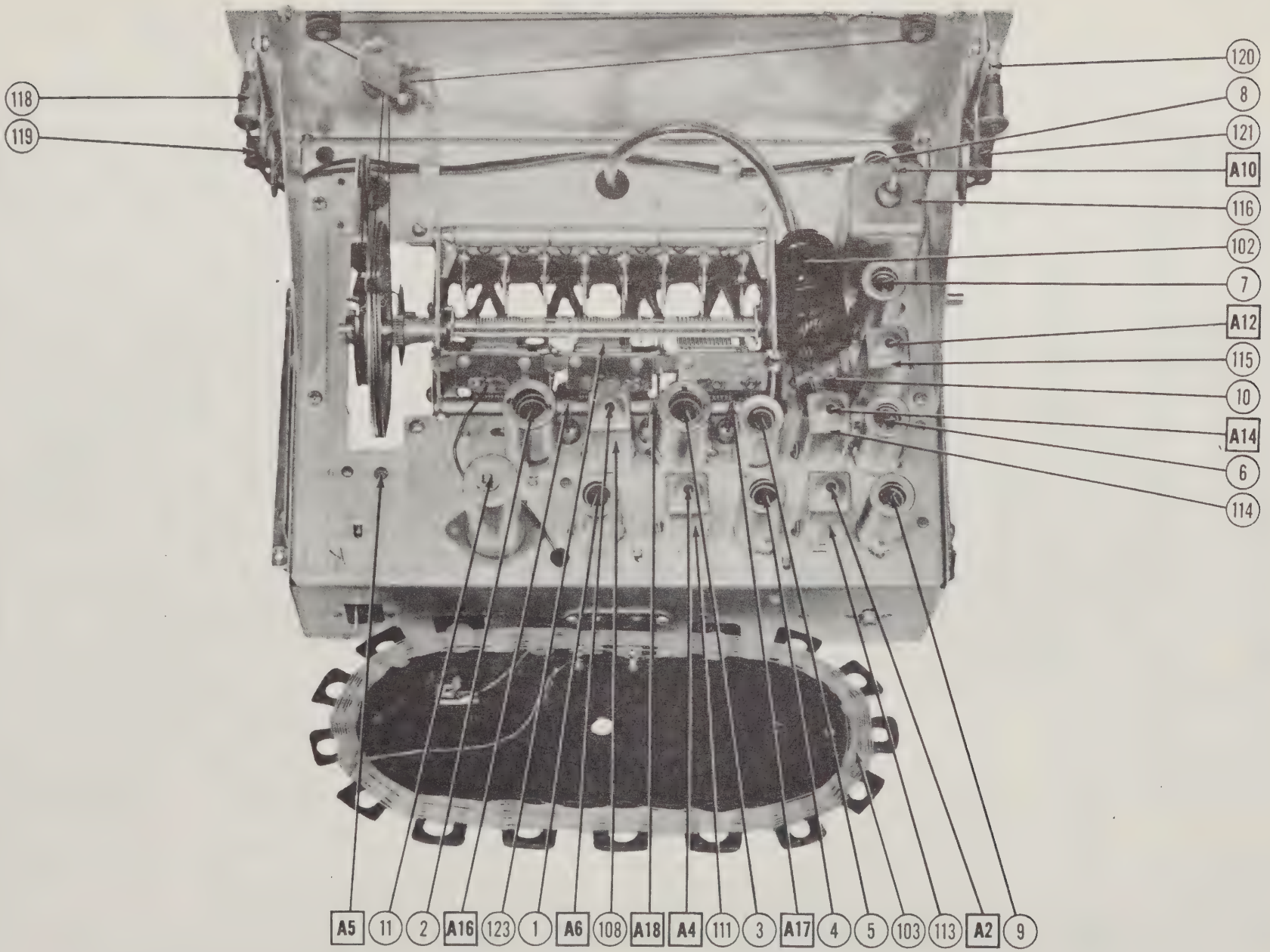
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113
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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: LEARADIO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	AM RF Amp.	6BA6	6BA6	7BK	
2	AM-FM Osc.	12AT7	12AT7		
3	AM-FM Mixer	12AT7	12AT7		
4	AM IF Amp.	6BA6	6BA6	7BK	
5	FM 1st IF Amp.	6AU6	6AU6	7BK	
6	FM-2nd IF Amp.	6BA6	6BA6	7BK	
7	FM 3rd IF Amp.	6BA6	6BA6	7BK	
8	FM Ratio Det.	6AL5	6AL5	6BT	
9	AM Det.-AVC-AF	6BF6	6BF6	7BT	
10	Tuning Eye	6AL7GT	6AL7GT	8CH	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: LEARADIO PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
11	20	450		AF4J	UP2045	DY-20-450	EL-2	AF Plate Decoupling
12	10	25		PRS25/10	BR102A	M-10-25	TA-10	Stabalizing Cap.
13	.05	600	56656	684-05	DT6S5	ST-6-05	TC-15	Audio Coupling
14	.05	600	56656	684-05	DT6S5	ST-6-05	TC-15	" "
15	.1	400	56631	484-.1	DT4P1	ST-4-1	TC-1	RF Bypass
16	.5	400	56635	484-.5	DT4P5	ST-4-5	TC-5	RF Byp. Pwr. Supply
17	.1	400	56631	484-.1	DT4P1	ST-4-1	TC-1	" " " "
18	.05	400	56628	484-05	DT4S5	ST-4-05	TC-15	AM Osc. Feedback
19	.05	400	56628	484-05	DT4S5	ST-4-05	TC-15	AM IF Screen Bypass
20	.05	400	56628	484-05	DT4S5	ST-4-05	TC-15	AM IF Cathode Bypass
21	.05	400	56628	484-05	DT4S5	ST-4-05	TC-15	RF Plate Decoup.
22	.05	400	56628	484-05	DT4S5	ST-4-05	TC-15	RF Screen Bypass
23	.05	400	56628	484-05	DT4S5	ST-4-05	TC-15	AVC Bypass
24	.02	400	56596	484-02	DT4S2	ST-4-02	TC-12	AM Mixer Cath. Bypass
25	47	500	56655	1468-00005	5W5Q5	MO.5-45	1FM-45	IF Coupling
26	330	500	56060	1468-00035	5W5T3	MO.5-33	1FM-335	RF Coupling
27	10	500		1469-00001	5R5Q1	MOS.5-41	MS-41	Fixed Trimmer-5%
28	330	500	56060	1468-00035	5W5T3	MO.5-33	1FM-335	RF Coupling
29	100	300	*	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter-Cer.
30	330	500	56060	1468-00035	5W5T3	MO.5-33	1FM-335	AF Cathode Bypass
31	330	500	56060	1468-00035	5W5T3	MO.5-33	1FM-335	Diode Filter
32	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	3rd FM IF Plate Decoup.-Cer.
33	330	500	56060	1468-00035	5W5T3	MO.5-33	1FM-335	Diode Load Cap.-Note
34	330	500	56060	1468-00035	5W5T3	MO.5-33	1FM-335	" " " "
35	330	500	56060	1468-00035	5W5T3	MO.5-33	1FM-335	RF Filter
36	2000	500		1467-002	1W5D2	MW.5-22	1FM-22	De-emphasis
37	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	Tuning Indicator Filter
38	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	AVC Bypass-Cer.
39	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	" " "
40	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	3rd FM IF Screen Byp.-Cer.
41	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	3rd FM IF Cath. Byp.-Cer.
42	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	2nd FM IF Plate Decoup.-Cer.
43	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	2nd FM IF Screen Byp.-Cer.
44	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	1st FM IF Decoup.-Cer.
45	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	1st FM IF Screen Byp.-Cer.

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: LEARADIO PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
91	39KΩ	½		BTA-39K	Or.-White-Or. 3rd FM IF Screen
92	3300Ω	½	55474	BTS-3300	Or.-Or.-Red 3rd FM IF Plate Decoup.
93	2.2 Meg.	½	55491	BTS-2.2 Meg.	Red-Red-Grn. 3rd FM IF Grid
94	2.2 Meg.	½	55491	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
95	47Ω	½	55463		Yl.-Vi.-Blk. RF Filter
96	39KΩ	½		BTA-39K	Or.-White-Or. De-emphasis
97	6800Ω	½	55476	BTS-6800	Blue-Gray-Red Ratio Det. Diode Load
98	6800Ω	½	55476	BTS-6800	Blue-Gray-Red Ratio Det. Diode Load
99	1000Ω	½	55471	BTS-1000	Br.-Blk.-Red Balancing Res.
100	6800Ω	½	55476	BTS-6800	Blue-Gray-Red Neutralizing
101	2.2 Meg.	½	55491	BTS-2.2 Meg.	Red-Red-Grn. Tuning Indicator Filter
102	3300Ω	½	55474	BTS-3300	Or.-Or.-Red Tuning Indicator Cathode
124	100KΩ	½	55483	BTS-100K	Br.-Blk.-Yl. AF Grid

*Items #29 and #72 are combined in one unit.

R F COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: LEARADIO PART No.	REPLACEMENT DATA: MEISSNER PART No.	
103	Ant. Loop AM		.5Ω	409522		
104	Wave Trap FM		.5Ω			
105	" " "		.5Ω			
106	FM Dipole					
107	Ant.Coil FM		.0Ω	40956		
108	RF Trans.	26Ω	6.5Ω	40918		
109	Osc.Coil AM		12.5Ω	40919		
110	" " FM		.5Ω	40931		
111	Input IF AM	12Ω	12Ω	40911-01	16-6668	
112	1st IF Coil		0Ω			
113	Output IF AM	12Ω	12Ω	40911-02	16-6669	
114	1st IF FM	1Ω	.5Ω	40913-01		
115	2nd IF FM	1Ω	.5Ω	40913-02		
116	FM Det.Trans	8Ω	2Ω	40917†		†Tertiary Winding is .2Ω
117	Fil. Choke		0Ω			

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
118-121	Bayonet	6-8	0.15	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	LEARADIO PART No.	NOTES
122	Switch		AM-FM
123	3 Gang Var. Cap	CN892910	(13-475MMF, 14-475MMF, 19-337MMF)

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	LEARADIO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
46	10	500		1469-00001	5R5Q1	MOS.5-41	MS-41	Fixed Trimmer 5%
47	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	IF Coupling-Cer.
48	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	FM Mixer Plate Decoup.-Cer.
49	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	RF Bypass Power Supply-Cer.
50	25	300		1469-000025	5R5Q25	MOS.5-425	MS-425	RF Coupling 10%-Cer.
51	3	500						FM Osc. Coupling-5%
52	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	FM Osc. Feedback-Cer.
53	20	500			5R5Q2	MOS.5-42	MS-42	FM Osc. Grid Cap.-10%-Cer.
54	47	500	56055					AM Osc. Grid Cap.-10%
55	5000	300	42202	1467-005	1D5D5	MW.5-25	1FM-25	3rd FM IF Grid Filter-Cer.

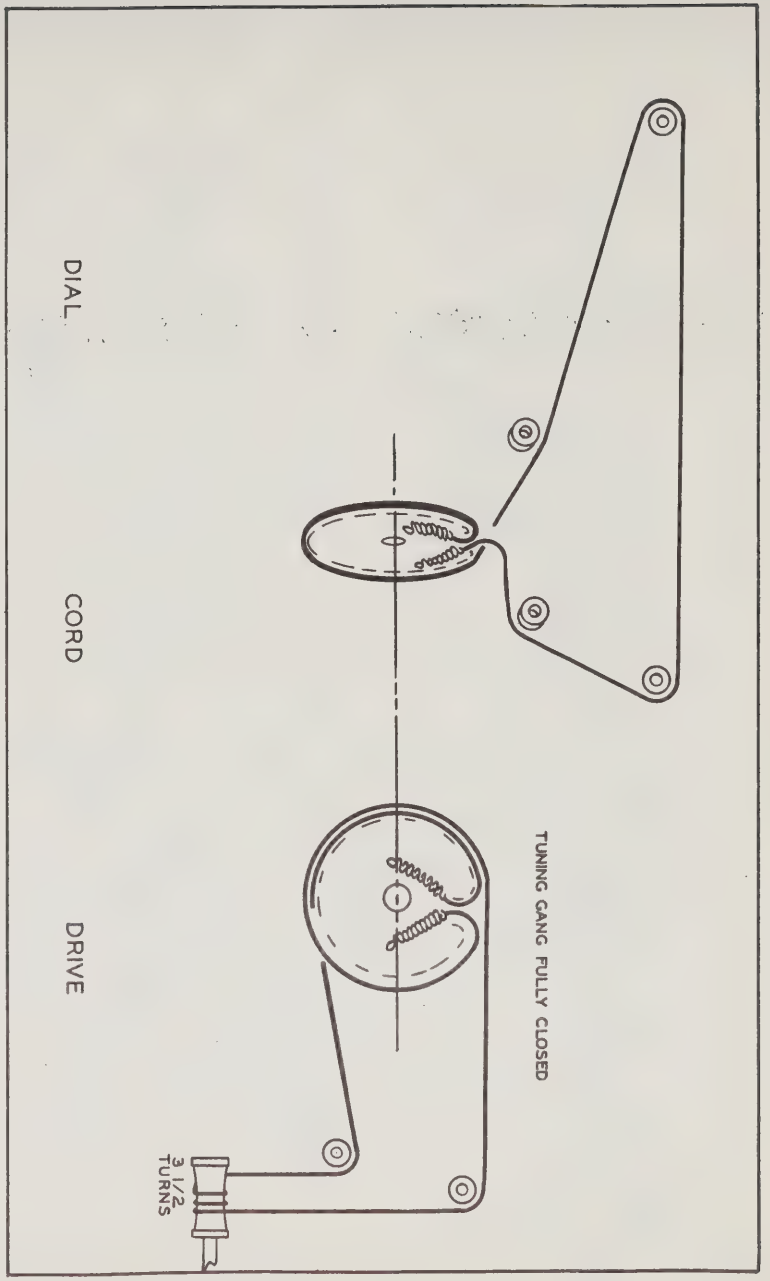
*Item #29 and Item #72 are combined in one unit.
Note-When either Item #33 or #34 are replaced, replace both with capacitors of equal value.

CONTROLS

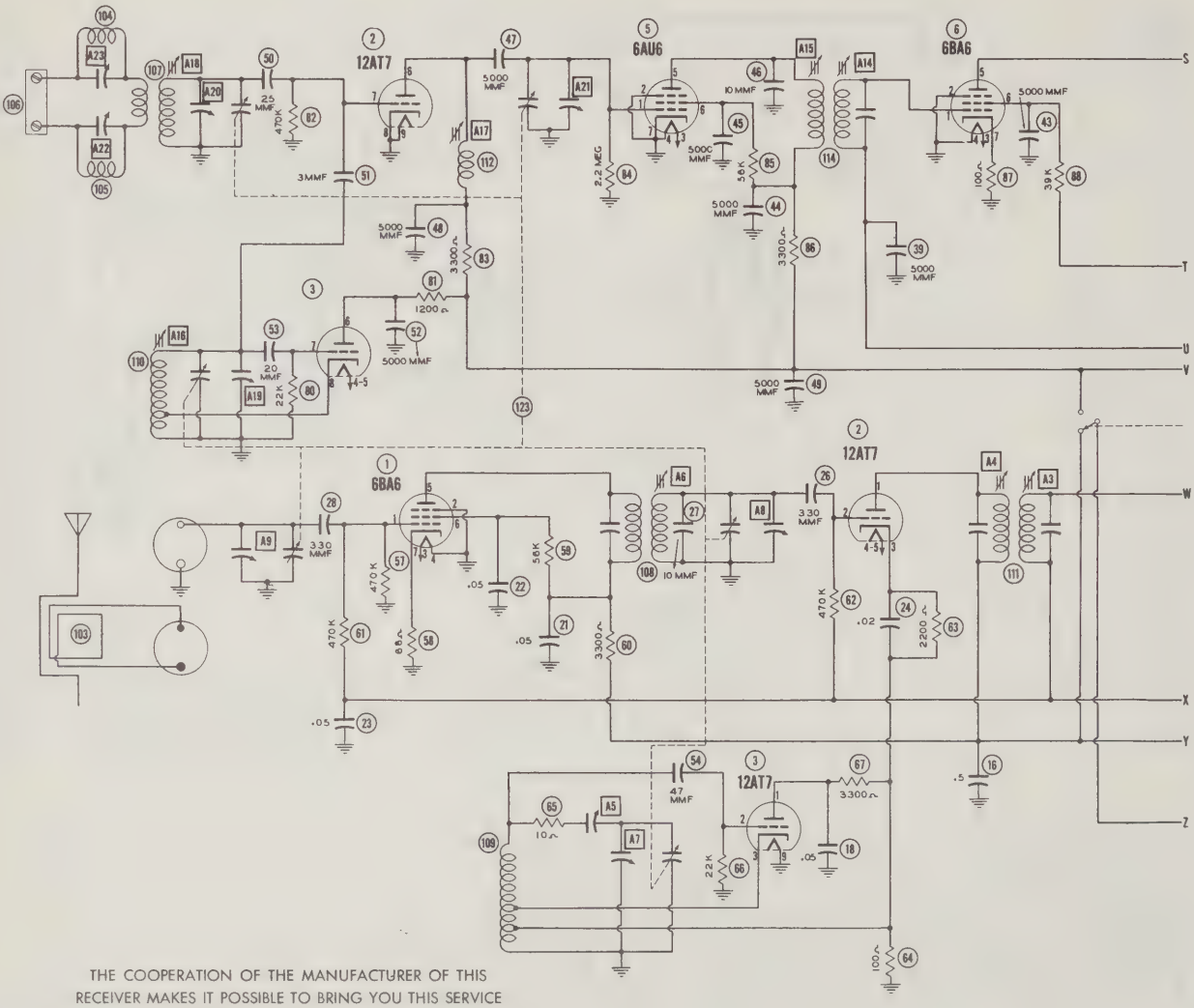
ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	LEARADIO PART No.	IRC PART No.	CLAROSTAT PART No.	
56	3000Ω	1		W-3000	43-3000	FM Balance Control

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	LEARADIO PART No.	IRC PART No.	
57	470KΩ	½	55487	BTS-470K	Yl.-Vi.-Yl. AM-RF Grid
58	68Ω	1	55464	BW-1-68	Blue-Gray-Blk. AM-RF Cathode
59	56KΩ	1		BTA-56K	Grn.-Blue-Or. AM-RF Screen
60	3300Ω	½	55474	BTS-3300	Or.-Or.-Red AM-RF Decoupling
61	470KΩ	½	55487	BTS-470K	Yl.-Vi.-Yl. AVC Network
62	470KΩ	½	55487	BTS-470K	Yl.-Vi.-Yl. AM Mixer Grid
63	2200Ω	½	55473	BTS-2200	Red-Red-Red AM Mixer Cathode
64	100Ω	½	55465	BW-½-100	Br.-Blk.-Br. " " "
65	10Ω	½	55459	BW-½-10	Br.-Blk.-Blk. Parasitic Suppressor
66	22KΩ	½	55479	BTS-22K	Red-Red-Or. AM Osc. Grid
67	3300Ω	½	55474	BTS-3300	Or.-Or.-Red AM Osc. Plate Load
68	2.2 Meg.	½	55491	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
69	2.2 Meg.	½	55491	BTS-2.2 Meg.	Red-Red-Grn. " "
70	100Ω	½	55465	BW-½-100	Br.-Blk.-Br. 1st AM IF Cathode
71	39KΩ	½		BTA-39K	Or.-White-Or. 1st AM IF Screen
72	100KΩ	½	*	BTS-100K	Br.-Blk.-Yl. Diode Filter
73	100KΩ	½	55483	BTS-100K	Br.-Blk.-Yl. Diode Load
74	22KΩ	½	55479	BTS-22K	Red-Red-Or. Diode Load
75	4700Ω	½	55475	BTS-4700	Yl.-Vi.-Red AF Cathode
76	4700Ω	½	55475	BTS-4700	Yl.-Vi.-Red " "
77	22KΩ	½	55479	BTS-22K	Red-Red-Or. AF Plate Load
78	22KΩ	½	55479	BTS-22K	Red-Red-Or. AF Plate Load
79	100KΩ	½	55483	BTS-100K	Br.-Blk.-Yl. AF Plate Decoup.
80	22KΩ	½	55479	BTS-22K	Red-Red-Or. FM Osc. Grid
81	1200Ω	½		BTS-1200	Br.-Red-Red FM Osc. Plate Load
82	470KΩ	½	55487	BTS-470K	Yl.-Vi.-Yl. FM Mixer Grid
83	3300Ω	½	55474	BTS-3300	Or.-Or.-Red FM Mixer Plate Decoup.
84	2.2 Meg.	½	55491	BTS-2.2 Meg.	Red-Red-Grn. 1st FM IF Grid
85	56KΩ	1		BTA-56K	Grn.-Blue-Or. 1st FM IF Screen
86	3300Ω	½	55474	BTS-3300	Or.-Or.-Red 1st FM IF Decoup.
87	100Ω	½	55465		Br.-Blk.-Br. 2nd FM IF Cathode
88	39KΩ	½		BTA-39K	Or.-White-Or. 2nd FM IF Screen
89	3300Ω	½	55474	BTS-3300	Or.-Or.-Red 2nd FM IF Plate Decoup.
90	68Ω	½	55464		Blue-Gray-Blk. 3rd FM IF Cathode



DATE 12/48-#4821-11 SET #51-FOLDER #11



THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

IF=455 KC AM

IF=10.7 MC FM

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

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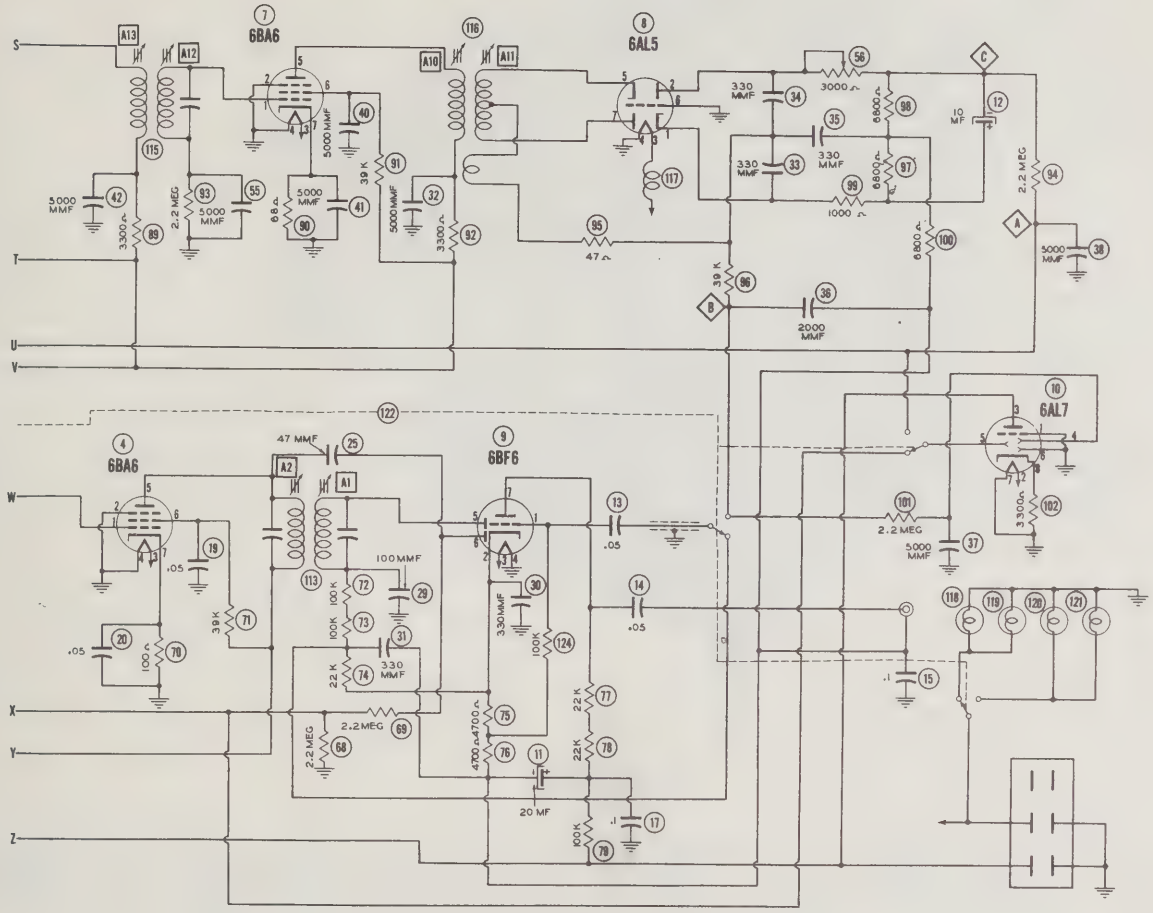

STAGE GAIN MEASUREMENTS			
RF GRID TO MIXER GRID	12X		600KC
CONVERSION GAIN	25X	IN OUT	600KC 455KC
INPUT IF TRANSFORMER	1X		455KC
IF TUBE	140X		455KC
OUTPUT IF TRANSFORMER	.7X		455KC
AUDIO	4X		400 ∿

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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use insulated alignment screwdriver for all adjustments

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.05 MFD	High side to Pin 2 (grid) of 12AT7 AM-FM Mixer (2). Low side to chassis.	455KC	BC (Counter-clock-wise)	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output
2		Loop	600KC	"	Tune for maximum output.	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Rock tuning cap. and adjust A5 for maximum output.
3		"	"	"	"	"	A6	Adjust for maximum output. Set pointer to 600KC reference mark.
4		"	1600KC	"	1600KC	"	A7	Adjust for maximum output.
5		"	"	"	Tune for maximum output.	"	A8,A9	Adjust for maximum output. Repeat Steps 2, 3, 4 & 5 until no further improvement can be made.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6	.05 MFD	High side to Pin 1 (grid) of 6BA6 3rd FM IF Tube (7). Low side to chassis.	10.7MC (Unmodulated)	FM (Clock-wise)	Tuning cap. fully open.	DC probe to Point (A). Common to chassis	A10	Adjust for maximum deflection.
7	.05 MFD	"	"	"	"	DC probe to Point (B). Common to chassis	A11	Set balance control (R) to approximately center rotation. Adjust A11 for zero deflection.
8	.05 MFD	High side to Pin 1 (grid) of 6BA6 2nd FM IF Tube (6). Low side to chassis.	"	"	"	DC probe to Point (A). Common to chassis	A12, A13	Adjust for maximum deflection.
9	.05 MFD	High side to Pin 1 (grid) of 6AU6 1st FM IF Tube (5). Low side to chassis.	"	"	"	"	A14,A15	Adjust for maximum deflection. Continue with FM-RF Alignment in Step 10.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
6	.01 MFD	High side to Pin 1 (grid) of 6BA6 2nd FM IF Tube (6). Low side to chassis.	10.7MC (Freq. Mod.)	FM (Clock-wise)	Tuning cap. fully open.	Vertical input to Point (C). Ground to chassis.	A10, A12, A13	Disconnect 10 MFD cap. (12) from Point (C). Adjust A10, A12 & A13 for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
7	.01 MFD	High side to Pin 1 (grid) of 6AU6 1st IF Tube (5). Low side to chassis.	"	"	"	"	A14, A15	Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1. Reconnect cap. (12) to Point (C).
8	.01 MFD	"	"	"	"	Vertical input to Point (B). Ground to chassis.	A11	Set balance control (R) to approx. center rotation. Adjust A11 for max. straightness of crossover lines with crossover occurring at center of pattern per Fig. 2. Continue with FM-RF Align., Step 10.

FM RF ALIGNMENT

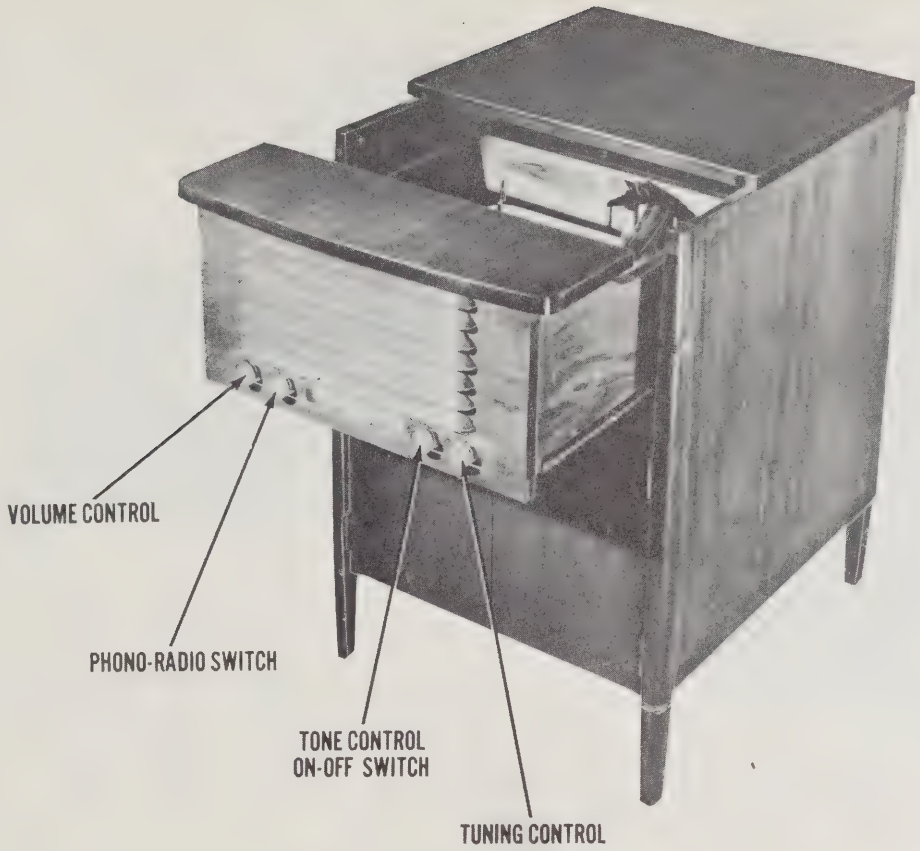
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
10	300Ω carbon res.	High side to one FM ant. terminal. Low side to other FM antenna terminal.	88MC (Unmodulated)	FM	88MC	DC probe to Point (A). Common to chassis	A16, A17, A18	Adjust for maximum deflection.
11	"	"	108MC (Unmodulated)	"	108MC	"	A19	"
12	"	"	"	"	Tune for maximum deflection.	"	A20, A21	Rock tuning cap. and adjust for maximum deflection. Repeat Steps 9, 10 and 11 until no further improvement can be made.
13	"	"	50.35MC (Unmodulated)	"	90MC (Approx.)	"	A22	Adjust for minimum deflection.
14	"	"	58.85MC (Unmodulated)	"	97MC (Approx.)	"	A23	"
				"	Tune to weak station.			Adjust balance control (R) for minimum background noise.

FIG. 1

FIG. 2

MANTOLA MODEL R-76262 (FACT. #7160-17)

MANTOLA MODEL R-76262 (FACT. #7160-17)



MANTOLA MODEL R-76262 (FACT. #7160-17)

MANTOLA MODEL R-76262

TRADE NAME	Mantola, Model R-76262 (Fact. #7160-17)
SUPPLIER	BF Goodrich, 500 S. Main, Akron, Ohio
TYPE SET	AC Operated Combination Phono-Radio, Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 12BE6 Converter, 12BA6 IF Amp., 12AT6 Det.-AVC-AF, 12AT6 Phase Inv., (2) 35B5 Power Output.
POWER SUPPLY	105-125 Volts AC
TUNING RANGE—BROADCAST	540-1600KC RATING .34 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

In Steps 1 & 2 with chassis removed from cabinet connect a 47KΩ resistor across loop leads. Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 7 (grid) of 12BE6. Low side to B-. (see pre-alignment instructions)	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2	.1 MFD.	"	1620KC	"	"	A5	Adjust for maximum output. Remove 47KΩ resistor and install chassis in cabinet with loop connected.
3		Loop	1400KC	Tune for maximum output.	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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DATE 12/48-#4821-12 SET #51-FOLDER #12

PARTS LIST AND DESCRIPTIONS

MANTOLA
MODEL R-76262

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: MANTOLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12BE6	12BE6	7CH	
2	IF Amp.	12BA6	12BA6	7BK	
3	Det.-AVC-AF	12AT6	12AT6	7BT	
4	Phase Inverter	12AT6	12AT6	7BT	
5	Power Output	35B5	35B5	7BZ	
6	" "	35B5	35B5	7BZ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MANTOLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	40	150	B55487-1	PRSA150/20-40	EZ42215	DSB-403020-150	TA-240	Filter-Red
B	20	150					"	-Blue
C	20	150		PRS150/20			UT-201	-Yellow
8	.05	400	BD410503	484-05	DT4S5	ST-4-05	TC-15	Line Filter
9	.05	400	BD410503	484-05	DT4S5	ST-4-05	72P1	Line Isolation
10	.02	400	BD410203	484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
11	.02	400	BD410203	484-02	DT4S2	ST-4-02	TC-12	" " "
12	.01	400	BD410103	484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
13	.01	400	BC31B103	484-01	DT4S1	ST-4-01	TC-11	" "
14	.01	400	DD410103	484-01	DT4S1	ST-4-01	TC-11	" "
15	.01	400	DD410103	484-01	DT4S1	ST-4-01	TC-11	" "
16	.003	600	BD610302	684-003	DT6D3	ST-6-003	TC-23	Tone Compensation
17	.1	400	BD410104	484-.1	DT4P1	ST-4-1	TC-1	Phono Isolation
18	.05	200	BD210503	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
19	470	500	BM74A471	1468-0005	5W5T5	MO.5-35	1FM-35	Output Grid Bypass
20	100	500	BM74A101	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MANTOLA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
21A	500KΩ	½	B-54466-2	D13-133	M-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 21A per instructions
22A	50KΩ	½	B-57841-1	D13-133	M-60-Z	Tone Control
B	Shaft		Not Req.	A	Not Req.	Attach to 22A per instructions
C	Switch		" "	41	SW-A	" " " " "

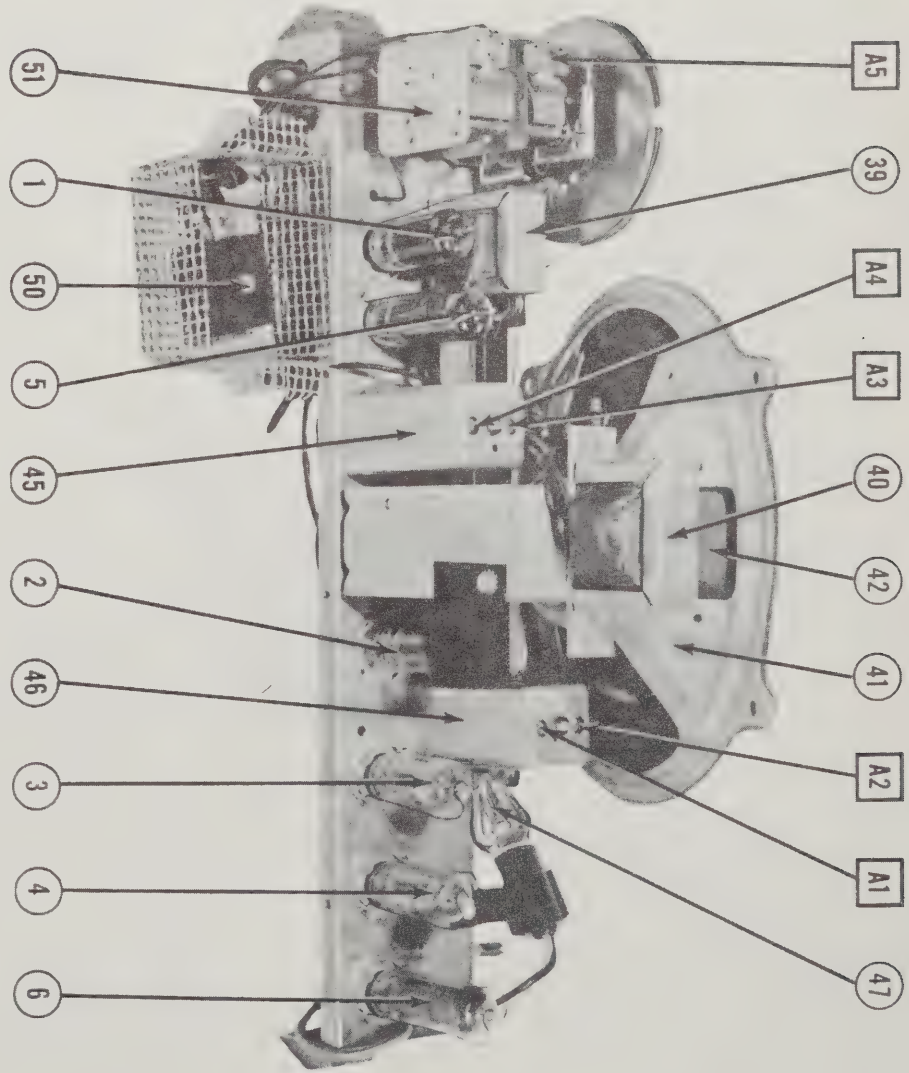
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MANTOLA PART No.	IRC PART No.	IDENTIFICATION CODES
23	22KΩ	½	BR17B223	BTS-22K	Red-Red-Or. Oscillator Grid
24	100Ω	½	BR16B101	BW-½-100	Br.-Blk.-Br. IF Cathode
25	3.3 Meg.	½	BR17B335	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
26	6.8 Meg.	½	BR17B685	BTS-6.8 Meg.	Blue-Gray-Grn. AF Grid
27	220KΩ	½	BR17B224	BTS-220K	Red-Red-Yl. AF Plate Load
28	220KΩ	½	BR17B224	BTS-220K	Red-Red-Yl. Phase Inverter Plate Load
29	6.8 Meg.	½	BR17B685	BTS-6.8 Meg.	Blue-Gray-Grn. Phase Inverter Grid
30	470KΩ	½	BR17B474	BTS-470K	Yl.-Vi.-Yl. Output Grid
31	470KΩ	½	BR17B474	BTS-470K	Yl.-Vi.-Yl. " "
32	15KΩ	½	BR16B153	BTS-15K	Br.-Grn.-Or. " "
33	100Ω	1	BR16B101	BW-1-100	Br.-Blk.-Br. Output Cathode
34	1500Ω	1	BR17E152	BTA-1500	Br.-Grn.-Red Filter
35	22Ω	1	BR17E220	BW-1-22	Red-Red-Blk. Surge Limiter
36	220KΩ	½	BR17B224	BTS-220K	Red-Red-Yl. Line Isolation
37	470KΩ	½	BR17B474	BTS-470K	Yl.-Vi.-Yl. Series Phono
38	220KΩ	½	BR17B224	BTS-220K	Red-Red-Yl. Phono Shunt

FILTER CHOKE

ITEM NO.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000)	REPLACEMENT DATA: MANTOLA PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	INSTALLATION NOTES
39	.07A	90Ω	1.5 Henries	B58635				

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MANTOLA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
40	6700Ω CT	3.6Ω	380Ω CT	.8Ω	Part of C-58621B	A-3823	T22S87	A-2901	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			MANTOLA PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.				
41	PM	3.6Ω	C-58621B			
	CONE DIA.	VC DIA.				
42	5"x7"	3/4"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	MANTOLA PART No.	MEISSNER PART No.	
43	Loop Ant.	.2Ω	1.6Ω	D-57870		
44	Osc. Coil	.7Ω	7.3Ω	B-57842		
45	Input IF	28Ω	20Ω	B-56722-2	16-6658	
46	Output IF	20Ω		B-56718-2	16-6670	

DIAL LIGHT

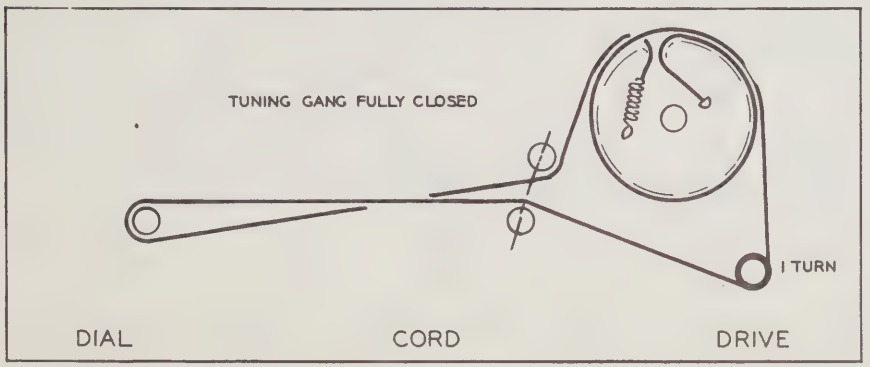
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					MANTOLA PART No.		
47	Screw	120			A55431		Type 7C7

PHONO CARTRIDGE

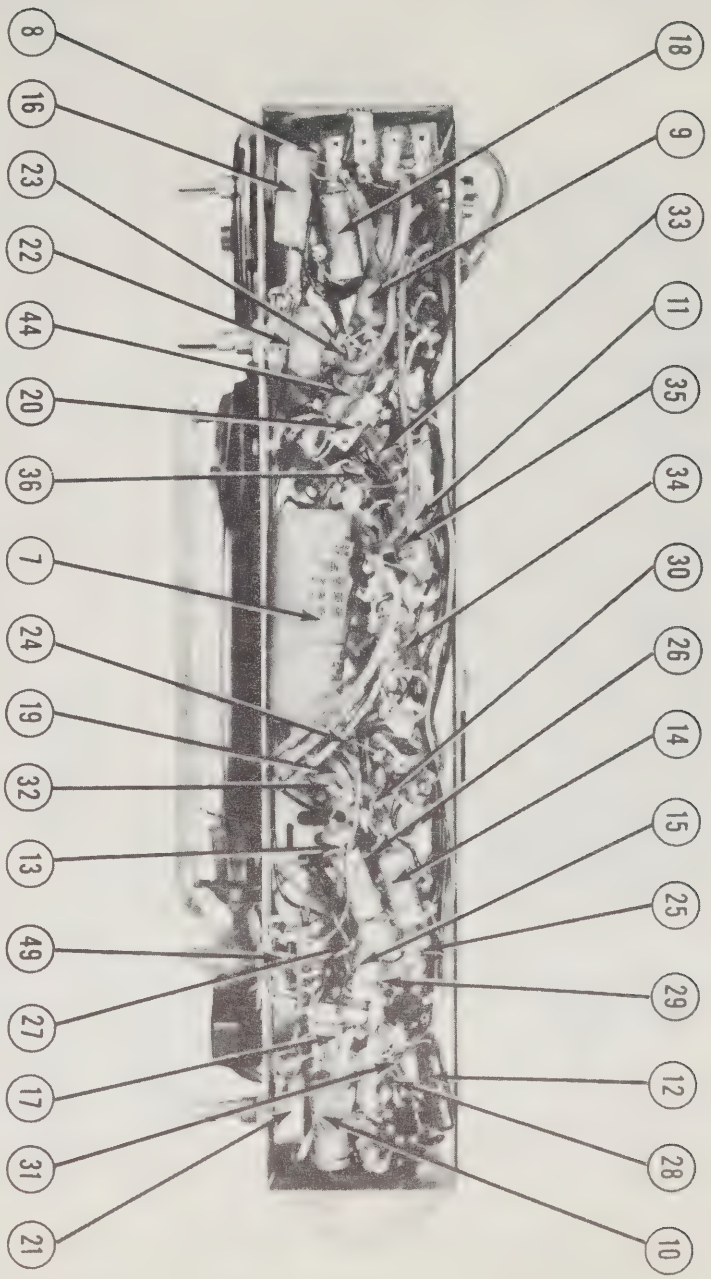
ITEM No.	REPLACEMENT DATA		REMARKS
	MANTOLA PART No.	ASTATIC PART No.	
48		L-70	

MISCELLANEOUS

ITEM No.	PART NAME	MANTOLA PART No.	NOTES
49	Switch	B-51576-2	Radio-Phono
50	Rectifier	A-58612	Selenium
51	2 Gang Var. Cap	C-57859-1	(19-437MMF, 23-182MMF)
	Cabinet	E58626-1	
	Dial Pointer	B-57852l	



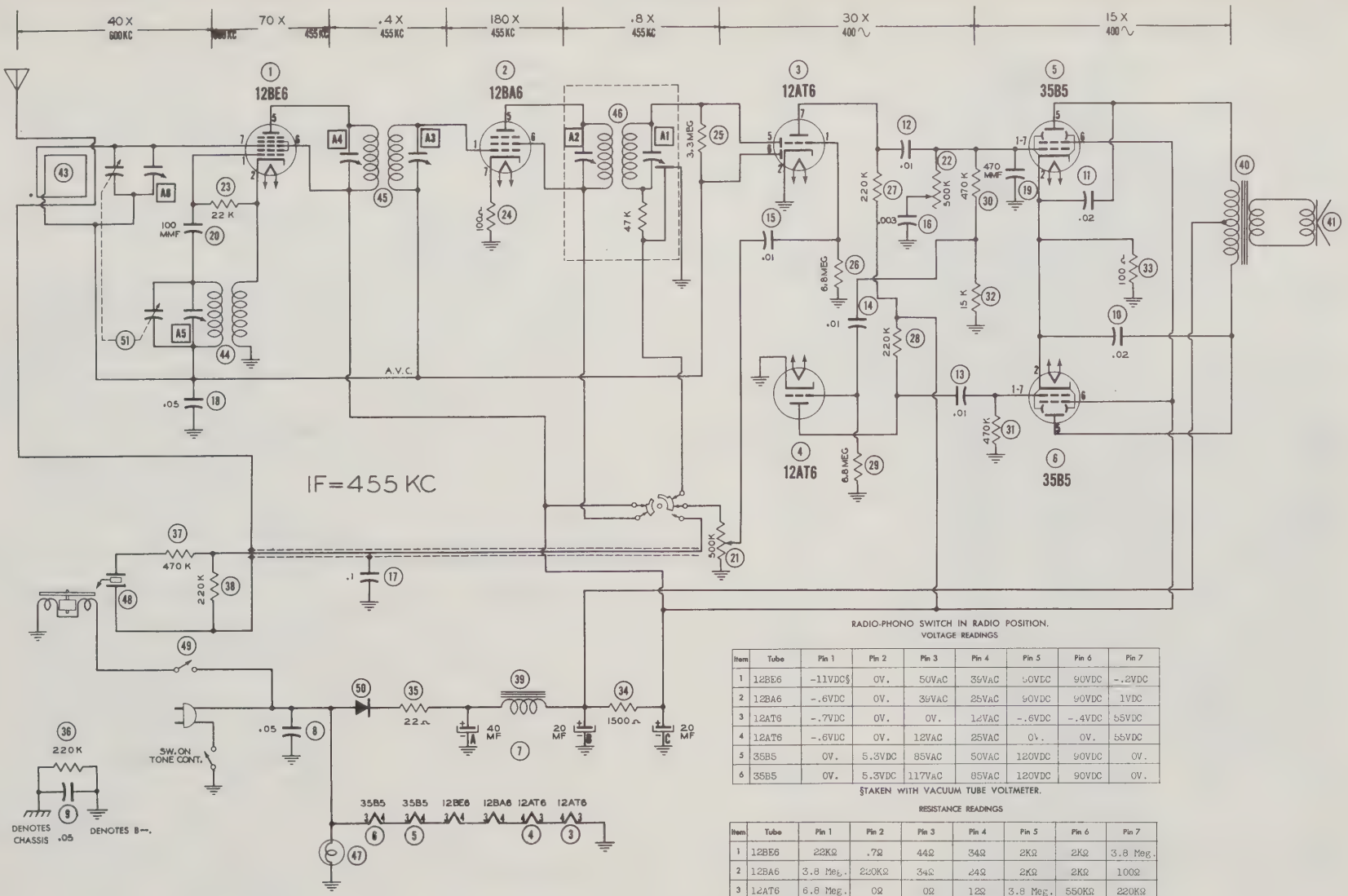
CHASSIS—BOTTOM VIEW



DATE 12/48-#4821-12 SET #51-FOLDER #12

MANTOLA
MODEL R-76262

MANTOLA
MODEL R-76262



RADIO-PHONO SWITCH IN RADIO POSITION.
VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	-11VDC§	0V.	50VAC	39VAC	90VDC	90VDC	-.2VDC
2	12BA6	-.6VDC	0V.	39VAC	25VAC	90VDC	90VDC	1VDC
3	12AT6	-.7VDC	0V.	0V.	12VAC	-.6VDC	-.4VDC	55VDC
4	12AT6	-.6VDC	0V.	12VAC	25VAC	0V.	0V.	55VDC
5	35B5	0V.	5.3VDC	85VAC	50VAC	120VDC	90VDC	0V.
6	35B5	0V.	5.3VDC	117VAC	85VAC	120VDC	90VDC	0V.

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	22KΩ	.7Ω	44Ω	34Ω	2KΩ	2KΩ	3.8 Meg.
2	12BA6	3.8 Meg.	250KΩ	34Ω	24Ω	2KΩ	2KΩ	100Ω
3	12AT6	6.8 Meg.	0Ω	0Ω	12Ω	3.8 Meg.	550KΩ	220KΩ
4	12AT6	6.8 Meg.	0Ω	1Ω	24Ω	INF.	INF.	220KΩ
5	35B5	485KΩ	100Ω	65Ω	44Ω	2KΩ	2KΩ	485KΩ
6	35B5	470KΩ	100Ω	65Ω	65Ω	2KΩ	2KΩ	470KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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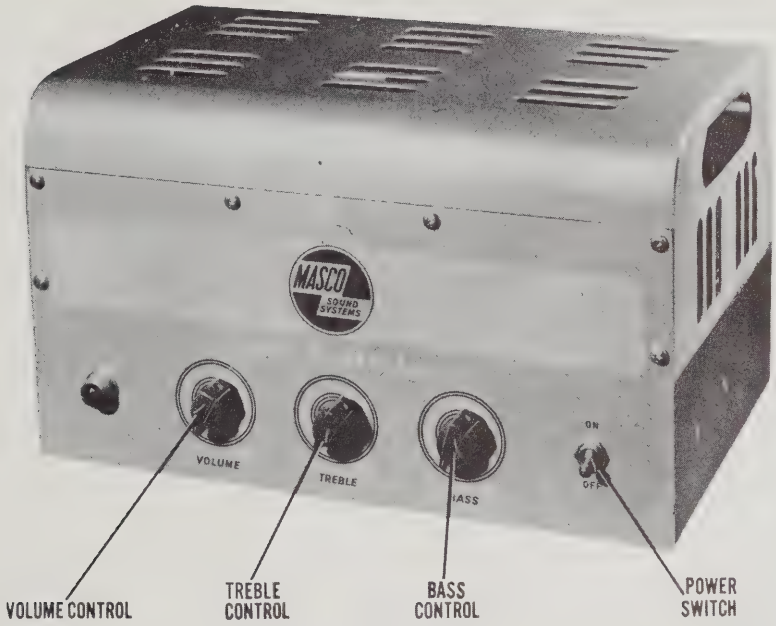
4821-12

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



MASCO MODEL MA-12HF

TRADE NAME	Masco, Model MA-12HF
MANUFACTURER	Mark Simpson Mfg. Co., Inc., 32-28 49th St., Long Island City 3, N.Y.
TYPE SET	AC Operated 2 Channel Audio Amplifier
TUBES (SIX)	Types, 6SC7 Phono Pre-Amp., 6SL7GT Mixer-AF, 6SL7GT AF-Phase Inv., (2) 6V6GT Power Output, 5Y3GT Rectifier.
POWER SUPPLY	105-117 Volts AC RATING .8 Amp. @ 117 Volts AC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SC7	0V.	40VDC	-.6VDC	-.6VDC	38VDC	0V.	3.5VAC	3.5VAC
2	6SL7GT	0V.	120VDC	1VDC	0V.	220VDC	1.2VDC	3.5VAC	3.5VAC
3	6SL7GT	0V.	145VDC	1.2VDC	0V.	130VDC	1.2VDC	3.5VAC	3.5VAC
4	6V6GT	0V.	3.5VAC	355VDC	310VDC	0V.	0V.	3.5VAC	20VDC
5	6V6GT	0V.	3.5VAC	355VDC	310VDC	0V.	0V.	3.5VAC	20VDC
6	5Y3GT	0V.	370VDC	0V.	350VAC	0V.	350VAC	0V.	370VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SC7	0Ω	130KΩ	1 Meg.	1 Meg.	130KΩ	0Ω	12.5Ω	12.5Ω
2	6SL7GT	10KΩ	130KΩ	1.5KΩ	0Ω	47KΩ	470Ω	12.5Ω	12.5Ω
3	6SL7GT	8.2KΩ	140KΩ	1.5KΩ	270KΩ	140KΩ	1.5KΩ	12.5Ω	12.5Ω
4	6V6GT	0Ω	12.5Ω	10KΩ	11KΩ	100KΩ	INF.	12.5Ω	200Ω
5	6V6GT	0Ω	12.5Ω	10KΩ	11KΩ	100KΩ	INF.	12.5Ω	200Ω
6	5Y3GT	INF.	10KΩ	INF.	50Ω	INF.	54Ω	INF.	10KΩ

NOTE-FILAMENT VOLTAGE MEASURES 7.0V AC ACROSS FILAMENT PINS.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, proper output load connected.

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DATE 12/48-#4821-13 SET #51-FOLDER #13

PARTS LIST AND DESCRIPTIONS

MASCO
MODEL MA-12HF

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		MASCO PART No.	STANDARD REPLACEMENT		
1	Phono Pre-Amp.	6SC7	6SC7	8S	
2	Mixer-AF	6SL7GT	6SL7GT	8BD	
3	AF-Phase Inv.	6SL7GT	6SL7GT	8BD	
4	Power Output	6V6GT	6V6GT	7AC	
5	" "	6V6GT	6V6GT	7AC	
6	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	MASCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
7	16	450		PRS450/16	BR1645	M-16-450	UT-16	Filter
8A	10	450		AF2222J	UP111145	DY-4x10-450	EL-410	"
B	10	450						▲ "
C	10	450						▲ "
D	10	450						■ "
9A	10	450		AF2222J	UP111145	DY-4x10-450	EL-410	▲ Decoupling
B	10	450						■ "
C	10	450						"
D	10	450						▲ "
10	50	50		PRS50/50	BR505	M-50-50	TA-550	Output Cathode Byp.
11	.1	600		684-.1	GT6P1	ST-6-1	TC-1	Line Filter
12	.1	600		684-.1	GT6P1	ST-6-1	TC-1	Audio Coupling
13	.1	600		684-.1	GT6P1	ST-6-1	TC-1	" "
14	.05	600		684-05	GT6S5	ST-5-05	TC-15	" "
15	.05	200		484-05	GT2S5	ST-4-05	TC-15	Tone Compensation
16	.001	600		684-001	GT6D1	ST-6-001	TC-21	" "
17	.01	600		684-01	GT6S1	ST-6-01	TC-11	" "
18	.1	600		684-.1	GT6P1	ST-6-1	TC-1	Audio Coupling
19	.05	600		684-05	GT6S5	ST-6-05	TC-15	" "
20	.05	600		684-05	GT6S5	ST-6-05	TC-15	" "
21	.05	200		484-05	GT2S5	ST-4-05	TC-15	" "
22	.1	600		684-.1	GT6P1	ST-6-1	TC-1	AF Plate Decoupling
23	.1	600		684-.1	GT6P1	ST-6-1	TC-1	" " "
24	500	500		1468-0005	5W5T5	MO.5-35	1FM-35	AF Plate Bypass
25	500	500		1468-0005	5W5T5	MO.5-35	1FM-35	Tone Compensation

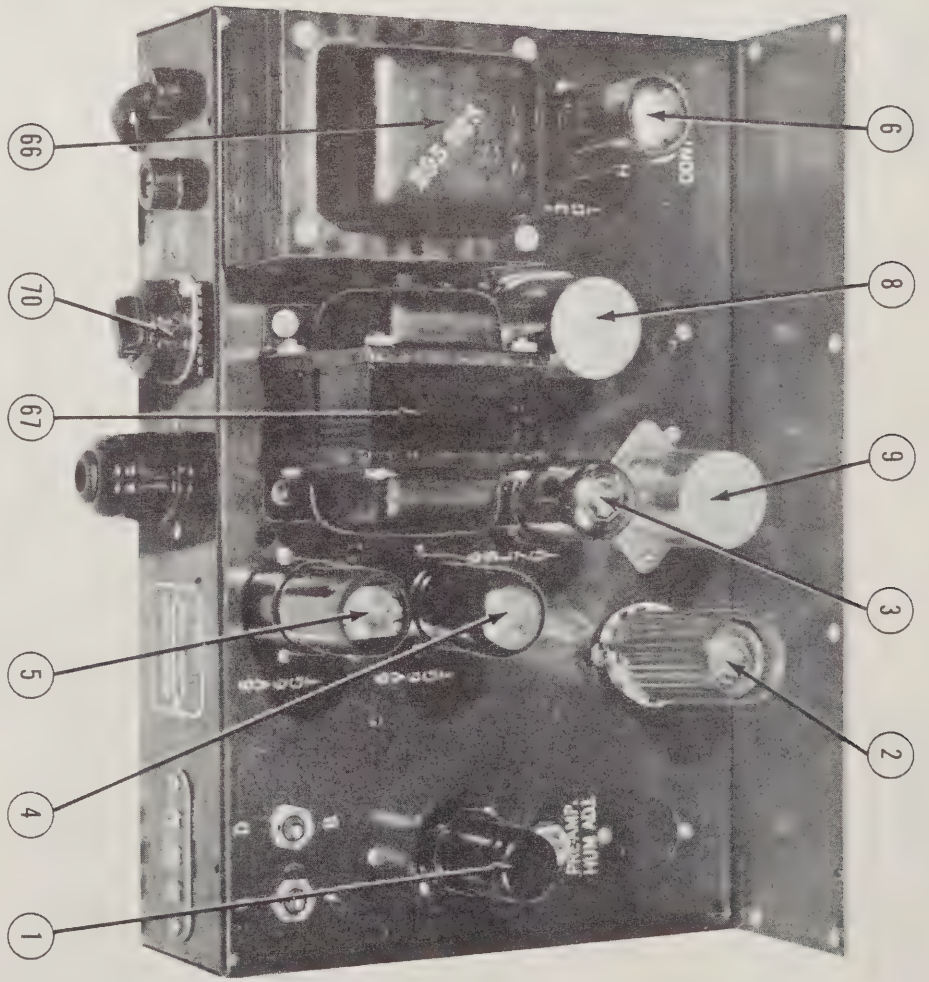
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	MASCO PART No.	IRC PART No.	CLAROSTAT PART No.	
26A	1 Meg.	½		DVC-539X		Volume Control tapped @ 500KΩ
B	Shaft			A		Attach to 26A per instructions
27A	500KΩ	½		D13-133	M-60-Z	Treble Control
B	Shaft			A	Not Req.	Attach to 27A per instructions
28A	500KΩ	½		D13-133	M-60-Z	Bass Control
B	Shaft			A	Not Req.	Attach to 28A per instructions
29	50Ω	1		W-50	43-50	Hum Bal. Control
30	50Ω	1		W-50	43-50	Pre-Amp. Hum Bal. Control

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	MASCO PART No.	IRC PART No.	
31	4700Ω	½		BTS-4700	Yl.-Vi.-Red Audio Voltage Divider
32	27KΩ	½		BTS-27K	Red-Vi.-Or. " " "
33	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Tone Compensation
34	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. 1st Pre-Amp. Grid
35	10KΩ	½		BTS-10K	Br.-Blk.-Or. 1st Pre-Amp. Plate Load
36	47KΩ	½		BTS-47K	Yl.-Vi.-Or. 1st Pre-Amp. Plate Decoupling
37	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. 2nd Pre-Amp. Grid
38	10KΩ	½		BTS-10K	Br.-Blk.-Or. 2nd Pre-Amp. Plate Load
39	47KΩ	½		BTS-47K	Yl.-Vi.-Or. 2nd Pre-Amp. Plate Decoupling
40	150KΩ	½		BTS-150K	Br.-Grn.-Yl. Bleeder
41	150KΩ	½		BTS-150K	Br.- Grn.-Yl. Voltage Dropping
42	15 Meg.	½		BTS-15 Meg.	Br.-Grn.-Blue Hum Balance

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	MASCO PART No.	IRC PART No.	
43	470Ω	½		BTS-470	Yl.-Vi.-Br. Mixer Cathode
44	10KΩ	½		BTS-10K	Br.-Blk.-Or. Mixer Plate Load
45	27KΩ	1		BTA-27K	Red-Vi.-Or. Mixer Plate Decoupling
46	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Tone Compensation
47	10KΩ	½		BTS-10K	Br.-Blk.-Or. " "
48	1500Ω	½		BTS-1500	Br.-Grn.-Red AF Cathode
49	47KΩ	½		BTS-47K	Yl.-Vi.-Or. AF Plate Load
50	270KΩ	½		BTS-270K	Red-Vi.-Yl. AF Grid
51	1500Ω	½		BTS-1500	Br.-Grn.-Red AF Cathode
52	100KΩ	½		BTS-100K	Br.-Blk.-Yl. AF Plate Load
53	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Phase Inverter Plate Load
54	1500Ω	½		BTS-1500	Br.-Grn.-Red Phase Inverter Cathode
55	8200Ω	½		BTS-8200	Gray-Red-Red Phase Inverter Grid
56	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Output Grid
57	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Output Grid
58	200Ω	10		AB-200	Output Cathode
59	10KΩ	20		AB-10K	Output Cathode Bias
60	150KΩ	½		BTS-150K	Br.-Grn.-Yl. Feedback
61	27KΩ	½		BTS-27K	Red-Vi.-Or. "
62	47KΩ	½		BTS-47K	Yl.-Vi.-Or. Decoupling
63	27KΩ	1		BTA-27K	Red-Vi.-Or. "
64	1250Ω	10		AB-1250	Filter
65	125Ω	10		AB-150	"

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	MASCO PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
66	117V AC @ .8A	700V CT .102A DC	5.3V AC @ 2.0A	7.0V AC @ 2.25A	A-17A	P-6013	T22R05	P-2953

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MASCO PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
67	10KΩ CT	4Ω 8Ω 15Ω 125Ω 250Ω 500Ω	210Ω CT	.3Ω .45Ω .65Ω 15.6Ω 21.5Ω 31.5Ω	T-12HF	A-3311#	T22S64	A-3132	#Drill new mounting holes.

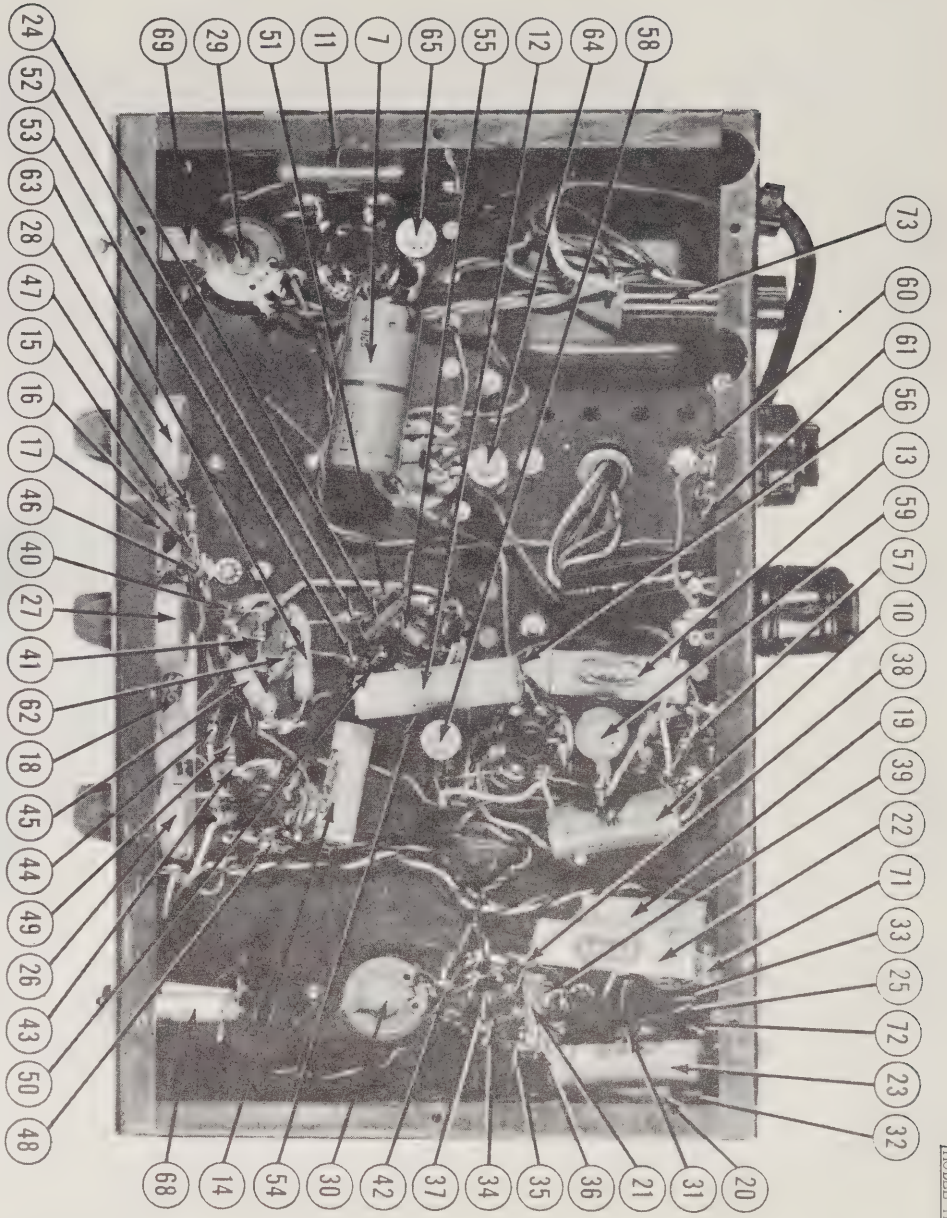
DIAL LIGHT

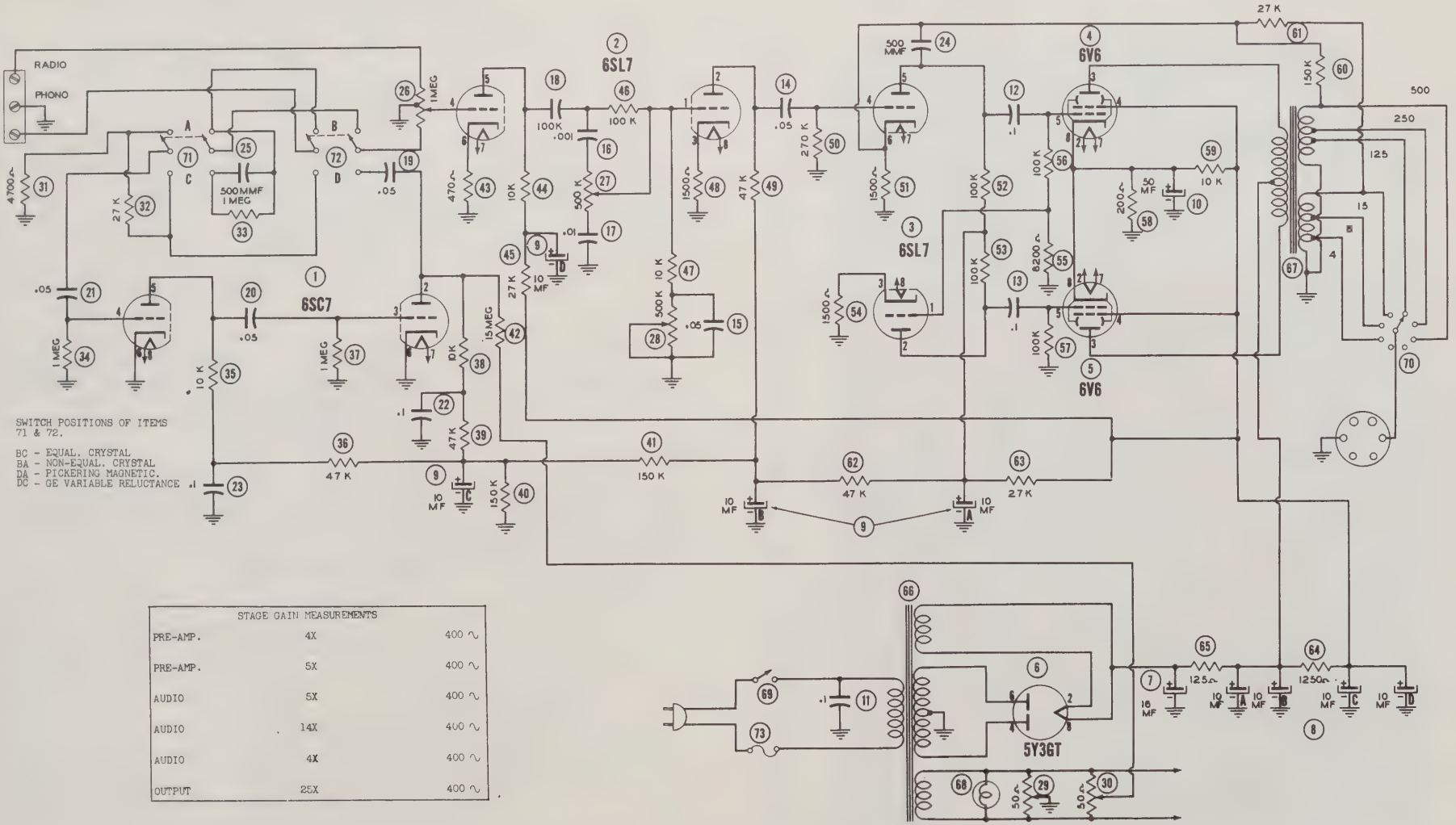
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					MASCO PART No.		
68	Bayonet	6-8	0.15	Brown			Type #47

MISCELLANEOUS

ITEM No.	PART NAME	MASCO PART No.	NOTES
69	Switch		On-Off
70	"		Impedence Selector
71	"		Phono Equalization
72	"		" "
73	Fuse		1.5 Amp.

CHASSIS—BOTTOM VIEW





STAGE GAIN MEASUREMENTS		
PRE-AMP.	4X	400 ~
PRE-AMP.	5X	400 ~
AUDIO	5X	400 ~
AUDIO	14X	400 ~
AUDIO	4X	400 ~
OUTPUT	25X	400 ~

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

4821-13

PHOTOFACT* Folder

*TRADE MARK

MOTOROLA MODELS VK101, VT101, VF102

MOTOROLA MODELS
VK101, VT101, VF102

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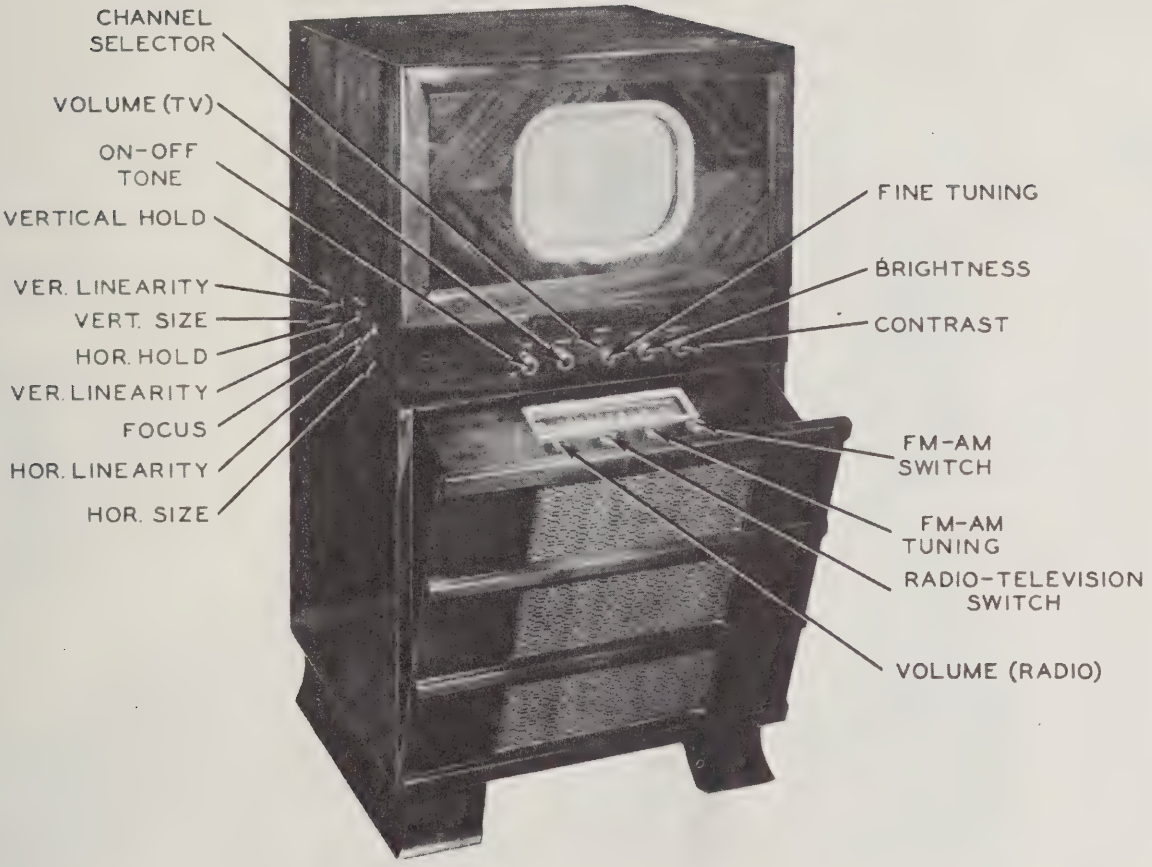

MOTOROLA MODEL VK101

TRADE NAME	Motorola, Models VT101, VK101, VK101M, VF102, VF102A, VF102C(Chassis TS-3,TS-5,TS-7)
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago, Ill.
TYPE SET	AM-FM, TV Receiver. Phonograph on VF102.
TUBES	Thirty-four.
POWER SUPPLY	105-125 V., 60 Cycles AC RATING 1.34 Amps. on Radio, 2.76 Amps. on TV @ 117V.
TUNING RANGE	540-1620KC, 88-108MC & Complete Thirteen Television Channel Coverage

TABLE OF CONTENTS

	Page		Page
TV Schematic	2	AM-FM Chassis, Bottom View	11
TV Chassis Top View-Left Side	3	Cabinet, Rear View	12
Disassembly Instructions	4	AFC Adjustment	12
TV Ant. Cable Assembly	4	Horizontal Linearity and Size Adjustments	12
TV RF and Osc. Alignment Points	4	Chassis Top View, Right Side	13
Block Diagram	5	TV Chassis Bottom View-Trans., Inductor and Alignment Identification	14
AM-FM Chassis, Top View	6	Dial Cord Stringing	15
TV Chassis Bottom View, Resistor Identification	7	Voltage and Resistance Measurements	16
Alignment Instructions	8,9	Parts List and Description	17,18,19,20
TV Chassis Bottom View, Capacitor Identification	10	Tube Placement Chart	21
		AM-FM Schematic	22

MOTOROLA MODELS VK101, VF102

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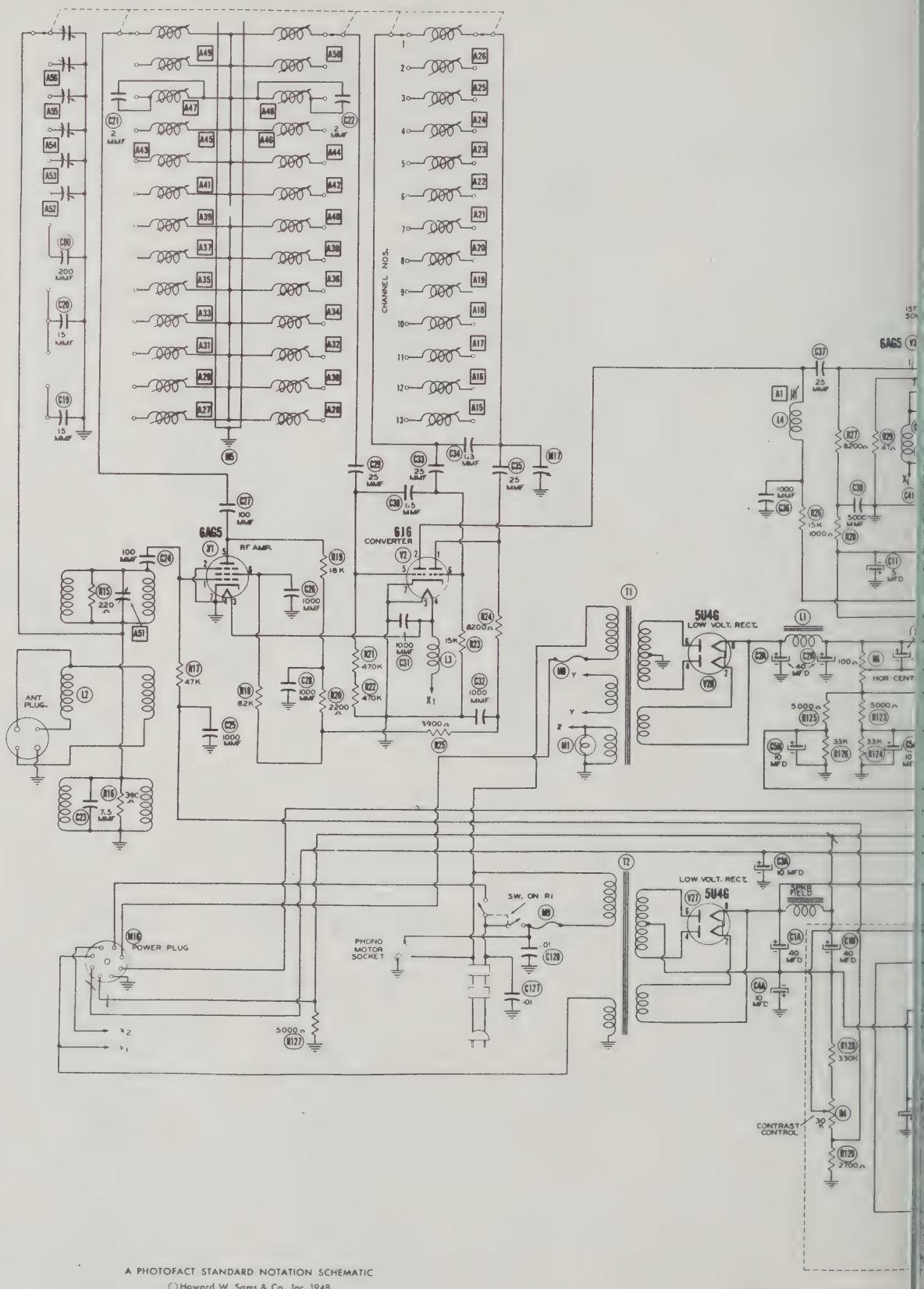

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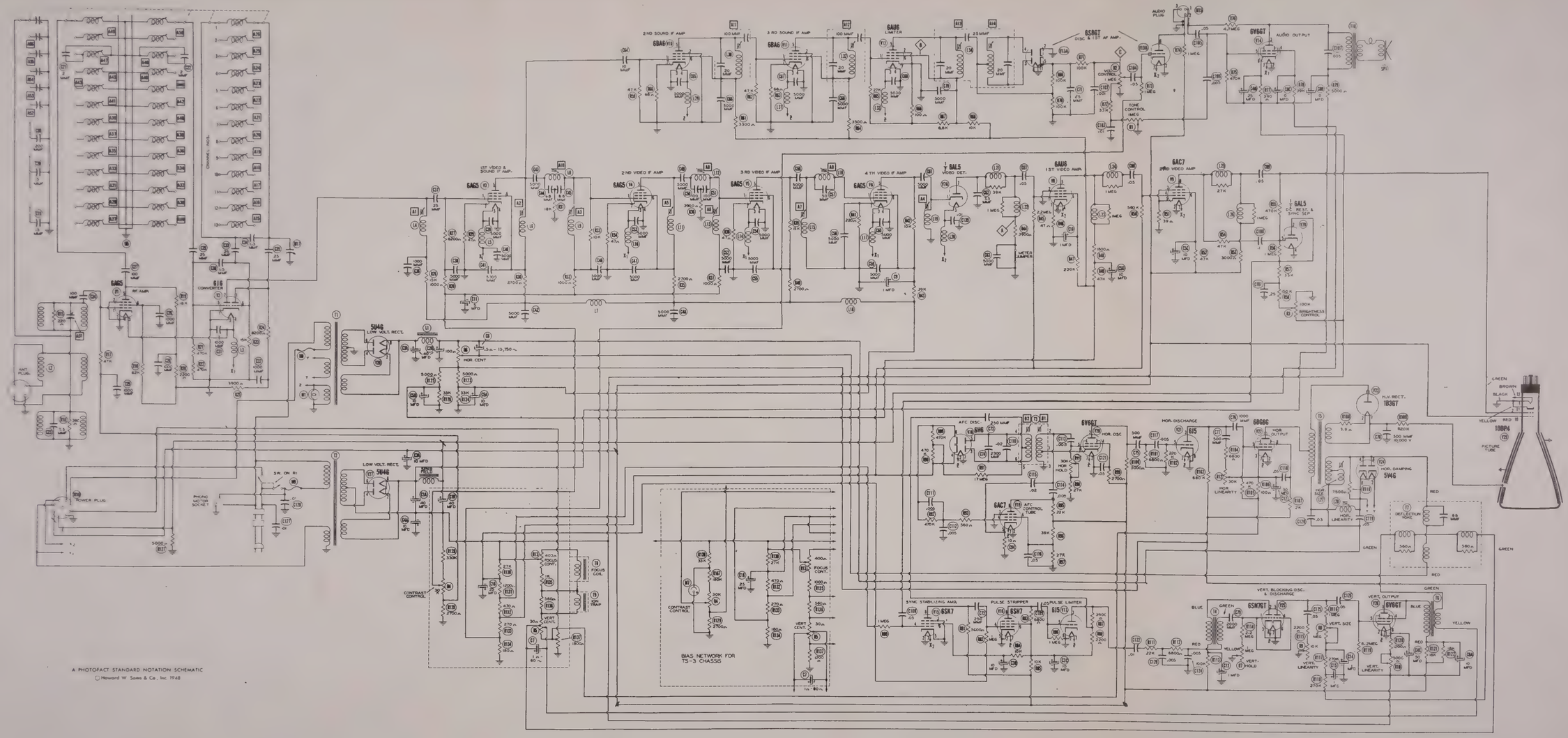
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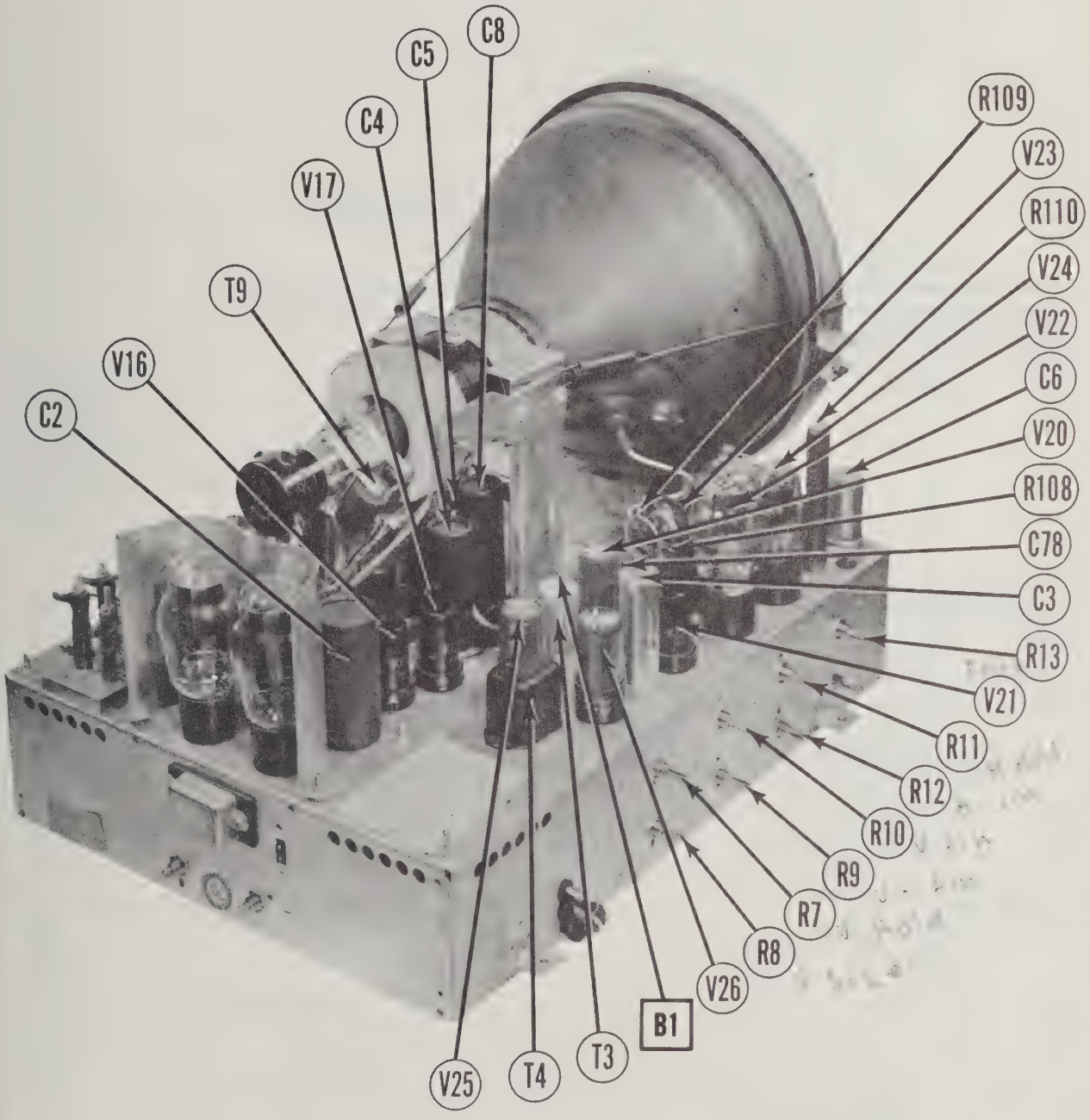
BIAS NETWORK FOR TS-3 CHASSIS
6AG5 RF AMP.
6J6 CONVERTER
6AG5 1ST VIDEO I.F. AMP.
6AG5 2ND VIDEO I.F. AMP.
6AG5 3RD VIDEO I.F. AMP.
6AG5 4TH VIDEO I.F. AMP.
6BA6 2ND SOUND I.F. AMP.
6BA6 3RD SOUND I.F. AMP.
6AU6 LIMITER
6AL5 VIDEO DET.
6AU6 1ST VIDEO AMP.
6SN7GT DISC. & 1ST AF AMP.
6V6GT AUDIO OUTPUT
6AC7 2ND VIDEO AMP
6AL5 D.C. REST. & SYNC SEP.
5U4G LOW VOLT. RECT.
5U4G LOW VOLT. RECT.
6BH6 AFC DISC.
6V6GT HOR. OSC.
6AC7 AFC CONTROL TUBE
6J5 HOR. DISCHARGE
6BG6G HOR. OUTPUT
1B3GT H.V. RECT.
5U4G HOR. DAMPING
6SN7 SYNC STABILIZING AMP.
6SN7 PULSE STRIPPER
6J5 PULSE LIMITER
6SN7GT VERT. BLOCKING OSC. & DISCHARGE
6V6GT VERT. OUTPUT
AUDIO PLUG
POWER PLUG
PICNIC MOTOR SOCKET
SW. ON R1
CHANNEL SEL.
ANT. 300Ω
CONTRAST CONTROL
FOCUS COIL
BEAM TRAP
HOR. CENT.
VERT. CENT.
TONE CONTROL
CONTROL
BRIGHTNESS CONTROL
HOR. HOLD
HOR. LINEARITY
VERT. HOLD
VERT. SIZE
VERT. LINEARITY
DEFLECTION YOKE
PICTURE TUBE
1B0P4
GREEN
BROWN
BLACK
YELLOW
RED
BLUE

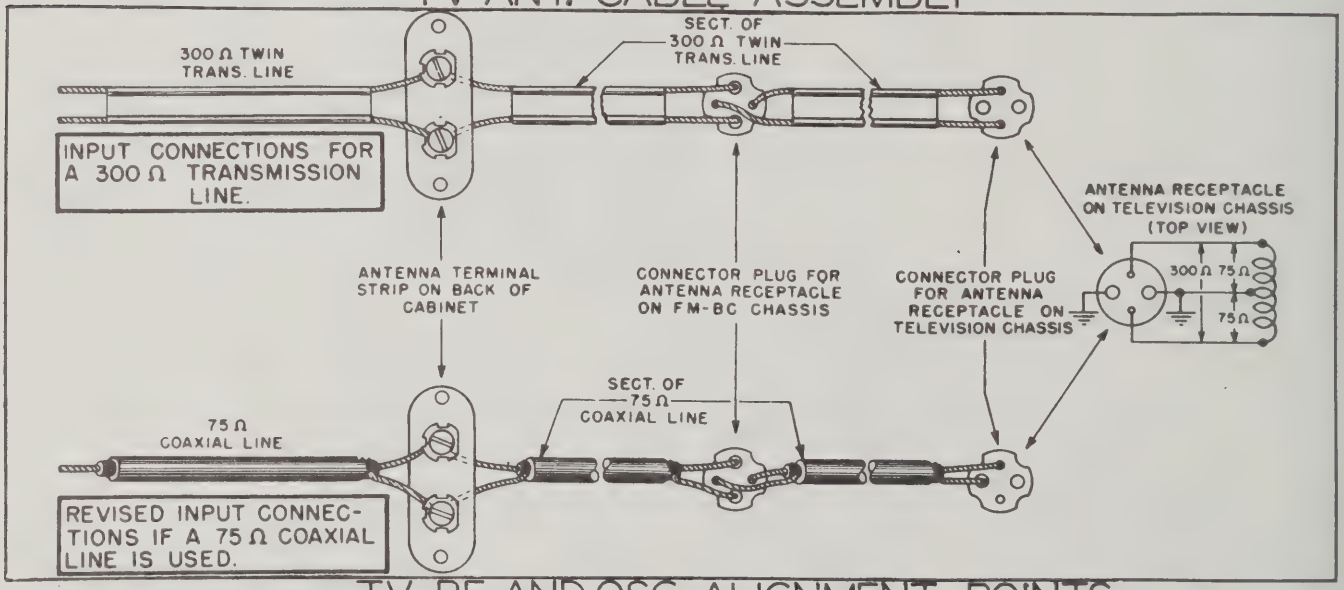


TV CHASSIS-TOP VIEW-LEFT SIDE

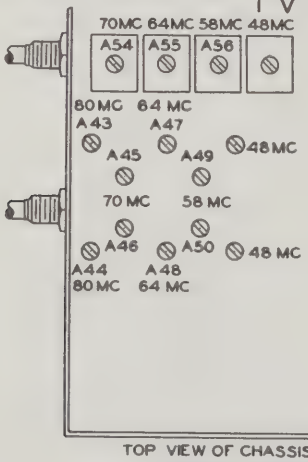
DISSASSEMBLY INSTRUCTIONS

1. Remove 20 screws holding backplate.
2. Remove backplate and power plug.
3. Remove five push-on type knobs on TV set.
4. Loosen two set screws in channel selector knob and remove.
5. Remove four screws holding wooden bracket supporting picture tube.
6. Unplug antenna from socket near front of TV chassis.
7. Unplug two power cables and speaker cable in lower compartment.
8. Remove four bolts holding TV chassis.
9. Pull power and speaker cable up through hole near TV chassis.
10. Carefully slide TV chassis out of cabinet. Lift rear of chassis slightly to prevent picture tube from binding on top of cabinet.
11. Remove pilot light below speaker from bracket.
12. Remove four nuts and lock washers holding speaker and remove speaker.
13. Remove four knobs on radio chassis.
14. Unplug antenna lead-in from radio chassis. Also remove small piece of fiver that holds antenna lead-in.
15. Remove four screws holding radio chassis to cabinet and remove radio chassis.
16. Remove three screws that hold radio chassis to wooden platform.

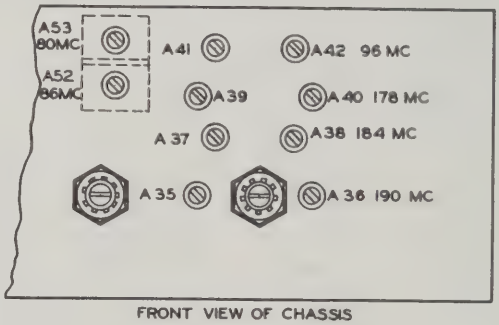
TV ANT. CABLE ASSEMBLY


300 Ω TWIN TRANS. LINE
SECT. OF 300 Ω TWIN TRANS. LINE
INPUT CONNECTIONS FOR A 300 Ω TRANSMISSION LINE.
ANTENNA RECEPTACLE ON TELEVISION CHASSIS (TOP VIEW)
300 Ω
75 Ω
75 Ω
ANTENNA TERMINAL STRIP ON BACK OF CABINET
CONNECTOR PLUG FOR ANTENNA RECEPTACLE ON FM-BC CHASSIS
CONNECTOR PLUG FOR ANTENNA RECEPTACLE ON TELEVISION CHASSIS
SECT. OF 75 Ω COAXIAL LINE
75 Ω COAXIAL LINE
REVISED INPUT CONNECTIONS IF A 75 Ω COAXIAL LINE IS USED.

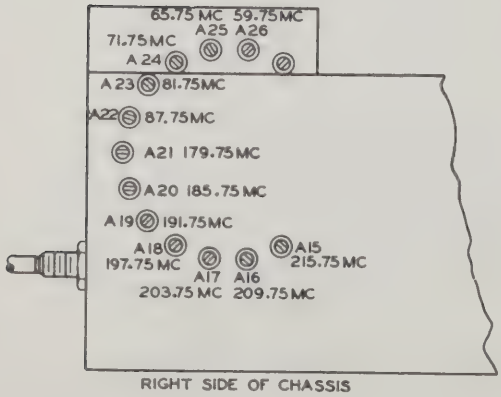
TV RF AND OSC. ALIGNMENT POINTS



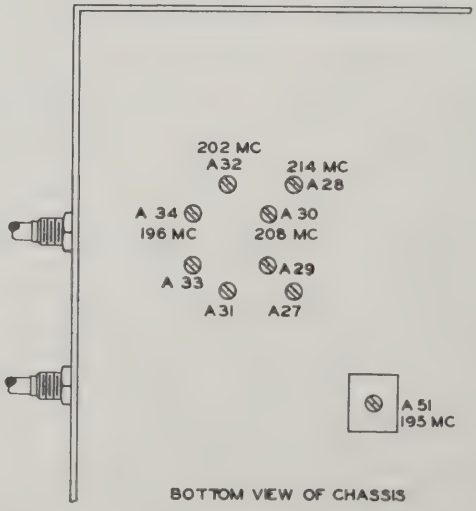
TOP VIEW OF CHASSIS WITH TOP SHIELD REMOVED



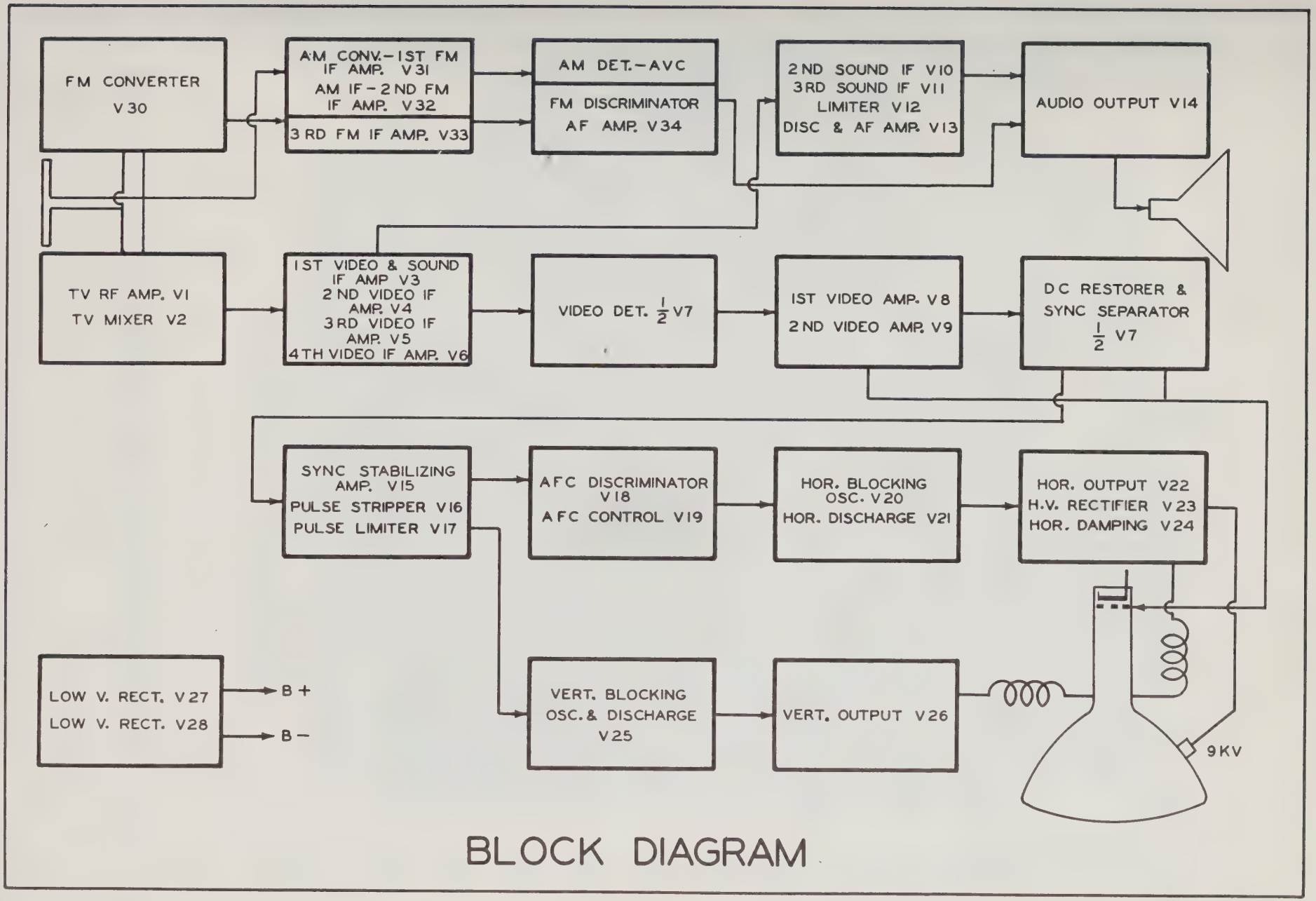
FRONT VIEW OF CHASSIS



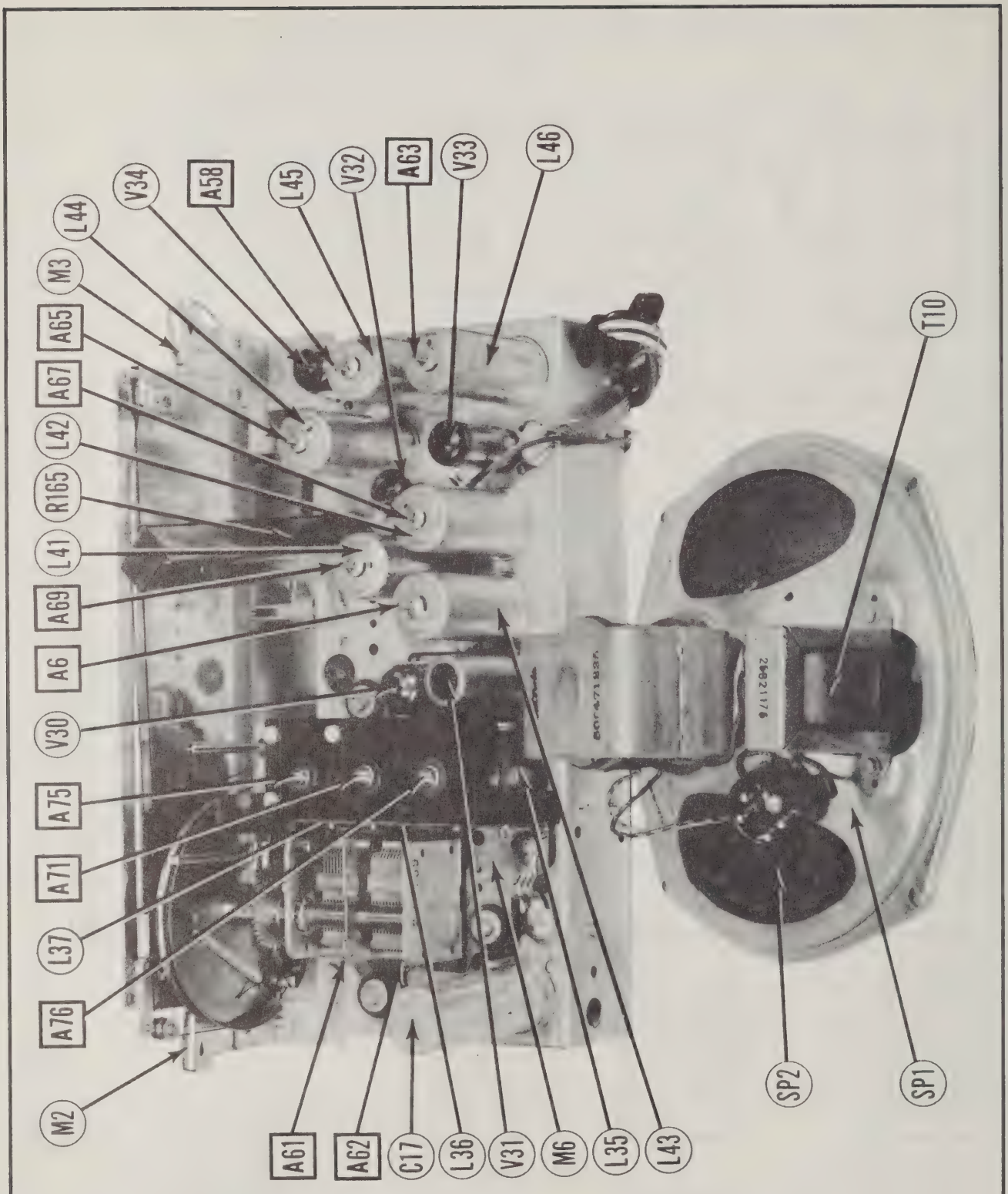
RIGHT SIDE OF CHASSIS



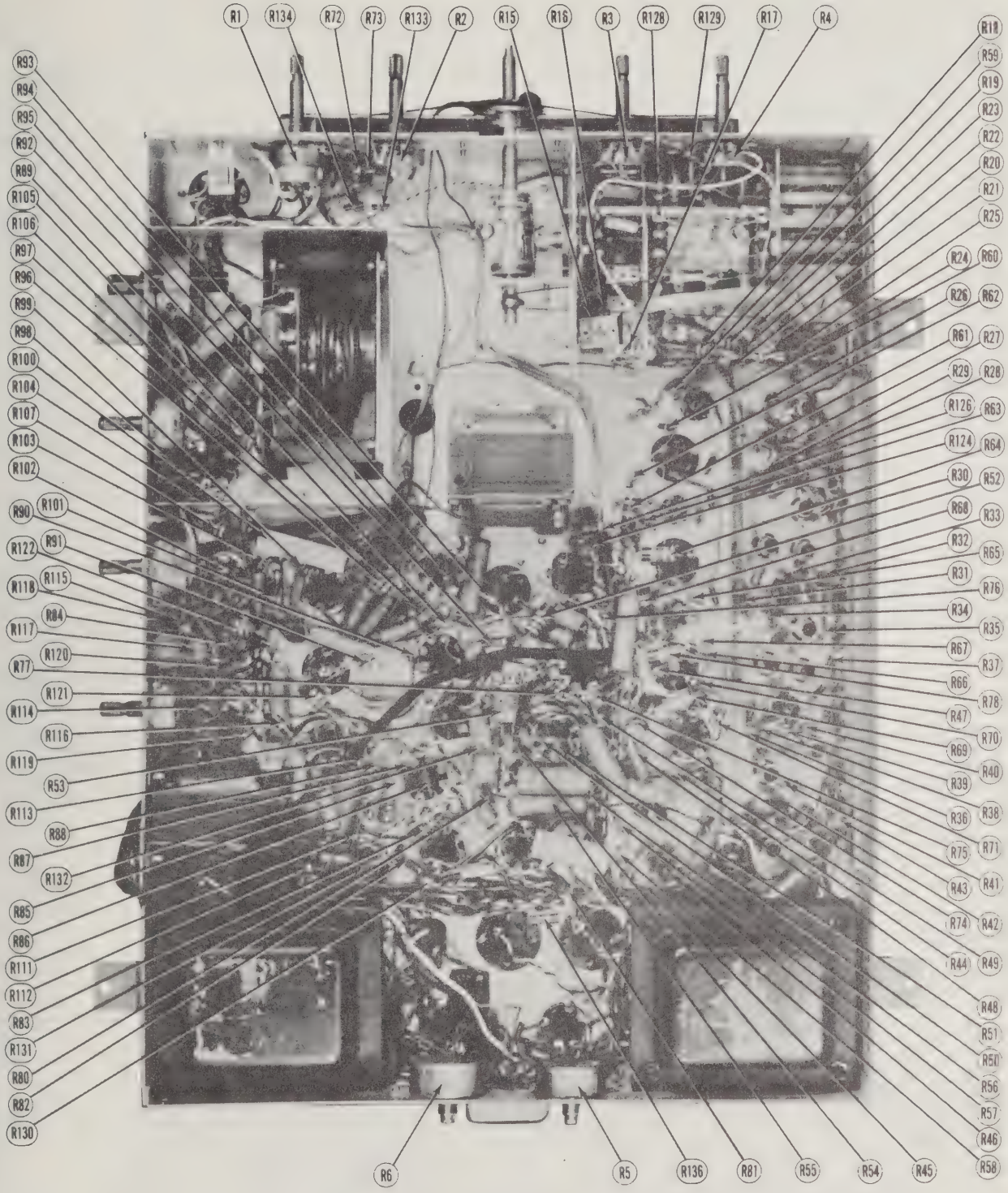
BOTTOM VIEW OF CHASSIS



BLOCK DIAGRAM



AM-FM CHASSIS-TOP VIEW



TV CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Remove horizontal oscillator, 6V6GT (V20) to disable high voltage. Cathode ray tube must be removed for some adjustments and may be left out during the entire alignment procedure.

Signal generator leads must be kept short as possible to avoid regeneration. Keep signal gen. cable away from IF stages.

Open the jumper between the bottom end of R44 and ground and connect an 0-500 microampere meter across C63. If the microammeter is not available, leave the jumper connected and connect a vacuum tube voltmeter, with the high side to the junction of L21 and L22, and the low side to chassis.

Adjust the contrast control for four volts measured at the center terminal to reduce the gain of the IF amplifier and reduce the possibility of oscillation. Leave at this setting throughout alignment procedure.

With the signal generator at zero there should be a contact potential current of from 50 to 100 microamperes. A reading higher than this indicates oscillation and should be corrected before alignment is attempted.

Use insulated alignment screwdriver for alignment.

VIDEO IF ALIGNMENT USING VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1	.001MFD	Pin #5 (grid) 6J6 (V2).	23.5MC	8	See prealignment instructions.	A1	Adjust for maximum. Be sure signal input is low enough to prevent overload.
2	.001MFD	"	22.75MC	"	"	A2 or A3	Adjust for maximum. Keep slugs approx. same position.
3	.001MFD	"	"	"	"	A4	Adjust for maximum.
4	.001MFD	"	24.75MC	"	"	A5 or A6	Adjust for maximum. Keep slugs approx. same position.
5	.001MFD	"	26MC	"	"	A7	Adjust for maximum.
6	.001MFD	"	21.9MC	"	"	A8	Adjust for minimum. Increase generator output for good reading.
7	.001MFD	"	20.5MC	"	"	A9	"
8	.001MFD	"	27.9MC	"	"	A10	"
9	.001MFD	"	22.75MC	"	"	A2 or A3	Recheck to compensate for effects of trap adjustments.
10	.001MFD	"	24.75MC	"	"	A5 or A6	"
11	.001MFD	"	26MC	"	"	A7	"

If sweep signal generator is available continue with Step 12, otherwise plot the IF response curve with VTVM and check against Figure 1.

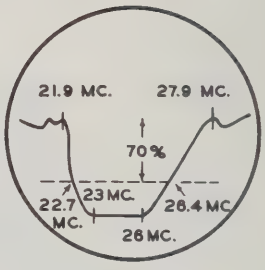


FIG. 1

VIDEO IF ALIGNMENT USING OSCILLOSCOPE

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12	.001MFD	Pin #5 (grid) of 6J6 (V2)	24MC 10MC sweep	See Fig. 1	8	High side to Point A. Low side to chassis.	A1,A2, A3,A4, A5,A6, A7	Replace meter jumper. Keep generator output low enough to prevent overloading. Pattern should be approximately as shown in Fig. 1. Make only slight adjustments.

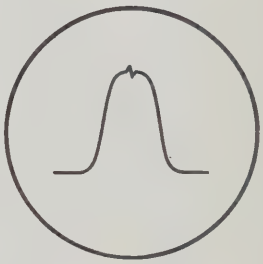


FIG. 2

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13	.001MFD	Pin #5 (grid) of 6J6 (V2)	21.9MC 600KC sweep	21.9MC	8	High side to Point B. Low side to chassis.	A11,A12	Adjust for maximum amplitude with marker at peak of curve, Fig. 2.
14	.001MFD	"	"	"	"	High side to Point C. Low side to chassis.	A13	Adjust for maximum amplitude and straightness of center line of "S" curve. See Fig. 3. Be sure gen. output is low enough to prevent limiter action.
15	.001MFD	"	"	21.9MC (400 ∿ mod.)	"	"	A14	Adjust for minimum audio signal which appear at ends of pattern. See Fig. 3. Audio signal will appear on either side of correct setting of A14.

ALTERNATE SOUND IF ALIGNMENT USING VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
13	.001MFD	Pin #5 (grid) of 6J6 (V2).	21.9MC	8	High side to Point C. Low side to chassis	A11,A12 A13	Detune A14 by turning two turns counterclockwise. Adjust A11, A12 and A13 for maximum deflection. Keep signal generator output low to prevent limiting.
14	.001MFD	"	"	"	"	A14	Adjust for zero. Slight movement in opposite directions should result in voltages of opposite polarity. Continue with Step 16.

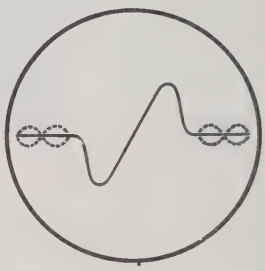


FIG. 3

RF ALIGNMENT USING VTVM

Connect the signal generator to the antenna terminals of the set through two resistors. The low side should be connected through 150 ohms. The resistor used in the high side should be 150 ohms minus the impedance of the generator. For instance, if the generator impedance is 50 ohms the resistor used should be 100 ohms.

It will be necessary to remove the cathode ray tube to reach the RF and antenna adjustments for the first five channels.

The contrast control should be set for four volt bias.

Connect a vacuum tube voltmeter across the volume control to indicate correct oscillator setting. Correct alignment may be indicated by a vacuum tube voltmeter across R44 or a microammeter in series with R44 (across C63).

Channel 1 has been omitted in many models and need not be aligned if included.

Leave the fine tuning control in half capacity position during oscillator and RF Alignment.

READ RF ALIGNMENT NOTES BEFORE CONTINUING WITH STEP 16

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
16	Resistive See above	Across antenna terminals	215.75MC	13	See above	A15	Adjust for zero across volume control. Polarity will change as adjustment is moved slightly about this point.
17	"	"	209.75MC	12	"	A16	"
18	"	"	203.75MC	11	"	A17	"
19	"	"	197.75MC	10	"	A18	"
20	"	"	191.75MC	9	"	A19	"
21	"	"	185.75MC	8	"	A20	"
22	"	"	179.75MC	7	"	A21	"
23	"	"	87.75MC	6	"	A22	"
24	"	"	81.75MC	5	"	A23	"
25	"	"	71.75MC	4	"	A24	"
26	"	"	65.75MC	3	"	A25	"
27	"	"	59.75MC	2	"	A26	"
28	"	"	214MC	13	"	A27,A28	Unscrew one adjustment until the circuit is appreciably detuned. Adjust the second slug for maximum deflection. Then adjust the first slug for maximum. Do not retune the second slug.
29	"	"	208MC	12	"	A29,A30	"
30	"	"	202MC	11	"	A31,A32	"
31	"	"	196MC	10	"	A33,A34	"
32	"	"	190MC	9	"	A35,A36	"
33	"	"	184MC	8	"	A37,A38	"
34	"	"	178MC	7	"	A39,A40	"
35	"	"	86MC	6	"	A41,A42	"
36	"	"	80MC	5	"	A43,A44	"
37	"	"	70MC	4	"	A45,A46	"
38	"	"	64MC	3	"	A47,A48	"
39	"	"	58MC	2	"	A49,A50	"
40	"	"	195MC	10	"	A51	Adjust for maximum.
41	"	"	86MC	6	"	A52	" " "
42	"	"	80MC	5	"	A53	" " "
43	"	"	70MC	4	"	A54	" " "
44	"	"	64MC	3	"	A55	" " "
45	"	"	58MC	2	"	A56	" " "

AM FM ALIGNMENT USING OUTPUT METER

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
46	.1 MFD.	Pin #7 (grid) of 6BE6 Converter (V31).	455KC Modulated	BC	1620KC (Fully open)	Across voice coil	A57,A58 A59,A60	Adjust for maximum output
47	.1 MFD.	"	1620KC	"	"	"	A61	" " " "
48	200MMF.	To antenna terminals.	1400KC	"	Tune to signal.	"	A62	" " " "
49	.001MFD	Pin #7 (grid) of 12AT7 (V30).	4.3MC	FM	Fully open.	"	A63,A64 A65,A66 A67,A68 A69	Detune discriminator by tuning A70 out as far as it will go. Adjust A63 through A69 for maximum output. Continue with Step 54.

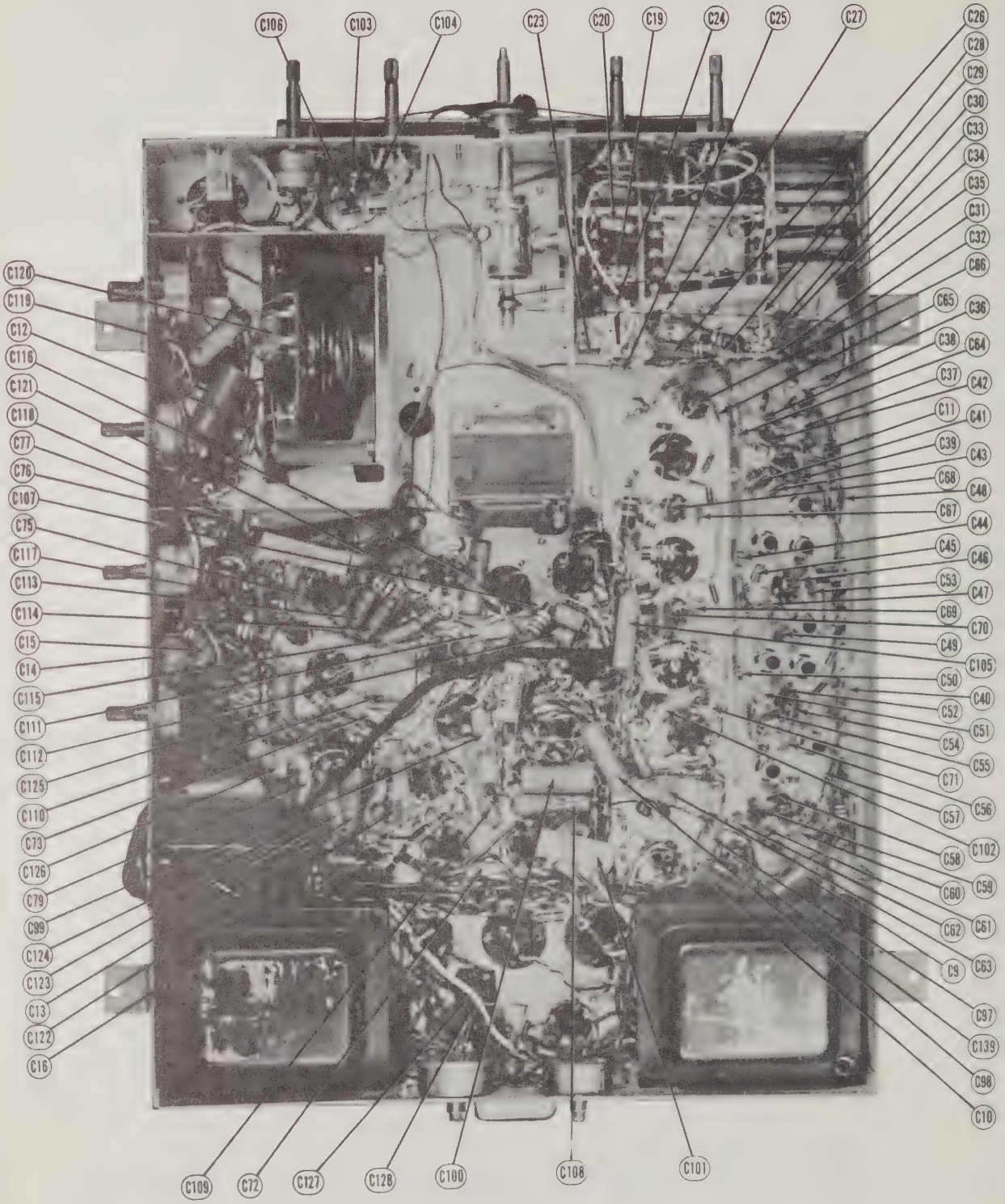
ALTERNATE FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
49	.001MFD.	Pin #1 (grid) of 6BA6 (V33).	4.3MC 250KC sweep	FM	Fully open.	Across volume control	A63	Adjust for maximum amplitude.
50	.001MFD.	"	"	"	" "	"	A70	Adjust for symmetrical pattern with peaks approximately 100KC above and below 4.3MC. Readjust A63 and A70 for maximum amplitude and linearity of response above and below center frequency.
51	.001MFD.	Pin #1 (grid) of 6BA6 (V32).	4.3MC 200KC sweep	"	" "	"	A64,A65	Adjust for maximum amplitude and best symmetry of pattern.
52	.001MFD.	Pin #1 (grid) of 6BE6 (V31).	"	"	" "	"	A66,A67	"
53	Direct	FM antenna terminals.	"	"	" "	"	A68,A69	Adjust for maximum amplitude and best symmetry of pattern. Before proceding with RF alignment detune A70 so that an output meter may be used

FM RF ALIGNMENT

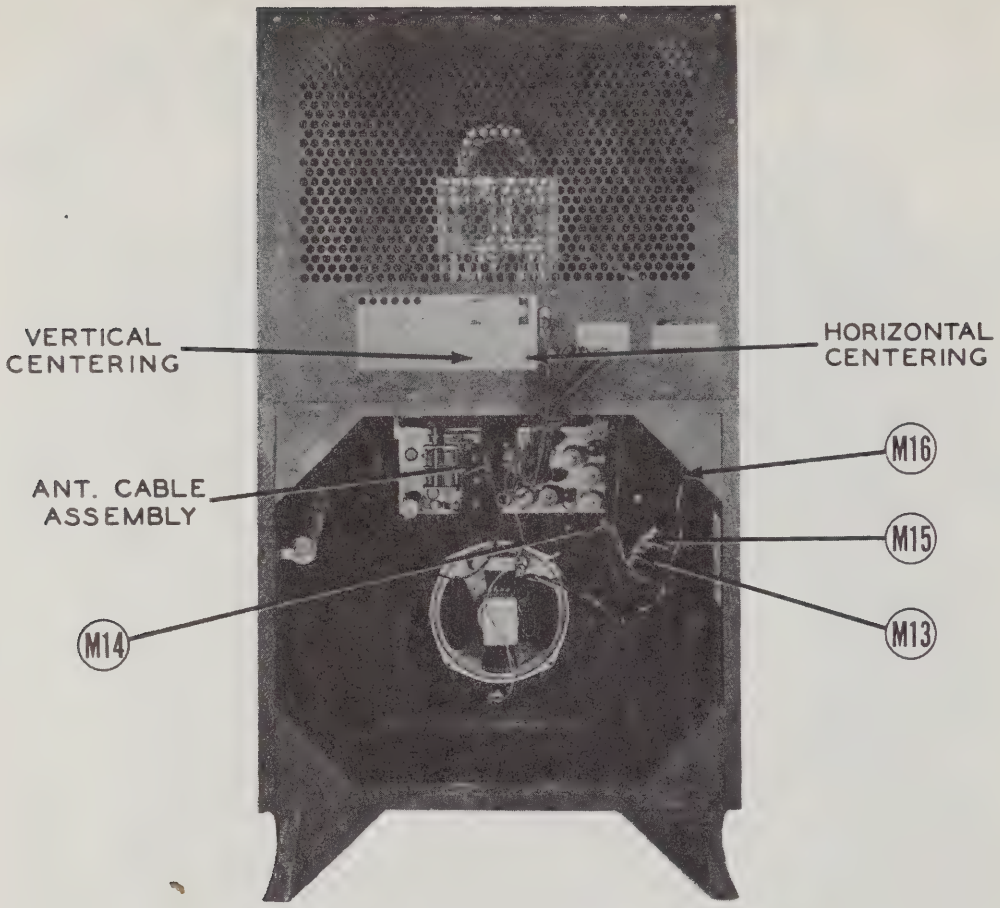
With gang fully closed adjust pointer to end of line on dial scale.
Check position of FM oscillator tuning core (A71). It should be two turns from tight against the bakelite plate.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
54	Direct	To antenna terminals.	98MC (Modulated)	FM	98MC (Distance between bakelite pieces 1-9/32")	Across voice coil	A72	Adjust for maximum output
55	"	"	90MC (Modulated)	"	Tune to signal.	"	A73,A74	" " " "
56	"	"	105MC (Modulated)	"	"	"	A75,A76	" " " "
57								Repeat Steps 51 and 52 until no further improvement is noted. Make the final adjustment at 105MC
58	300Ω	FM antenna terminals.	105MC (Modulated)	FM	105MC	Across voice coil.	A73	Adjust for maximum output.
59	.001MFD	Pin #7 (grid) of 12AT7 (V30).	4.3MC (Modulated)	"	Fully open	"	A70	Adjust for minimum. Correct setting is sharply defined minimum between two maximums.



TV CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

AM-FM CHASSIS-BOTTOM VIEW



CABINET-REAR VIEW

AFC ADJUSTMENT

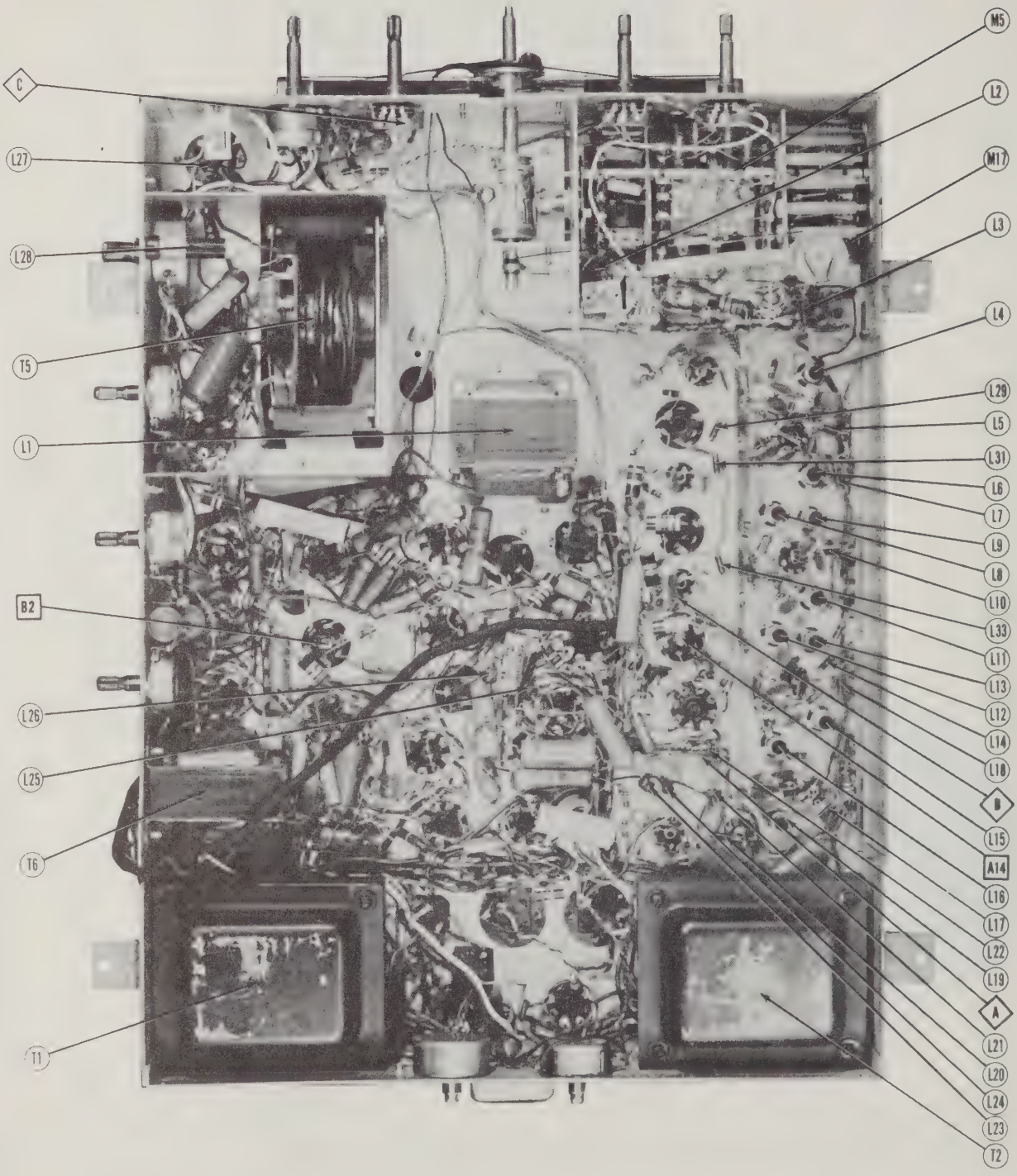
Rotation of the horizontal hold control to either extreme should not throw the horizontal oscillator out of synchronization. If it does fall out of synchronization, the AFC system should be aligned.

With a television signal tuned in, adjust the vertical hold control until the picture is stable vertically. Set the horizontal hold control in the center of its rotation. Ground the grid of V-17 which removes synchronizing pulses from both the horizontal and the vertical system, so the picture will drift vertically. Adjust B-1 until the picture lines are stable horizontally. Remove the short. The picture should lock, but will probably be folded on the left side. Adjust B-2 until the picture unfolds. Replace the short and again adjust B-1 for picture stability. After removing the short, again adjust B-2 for maximum picture width.

HORIZONTAL LINEARITY AND SIZE ADJUSTMENTS

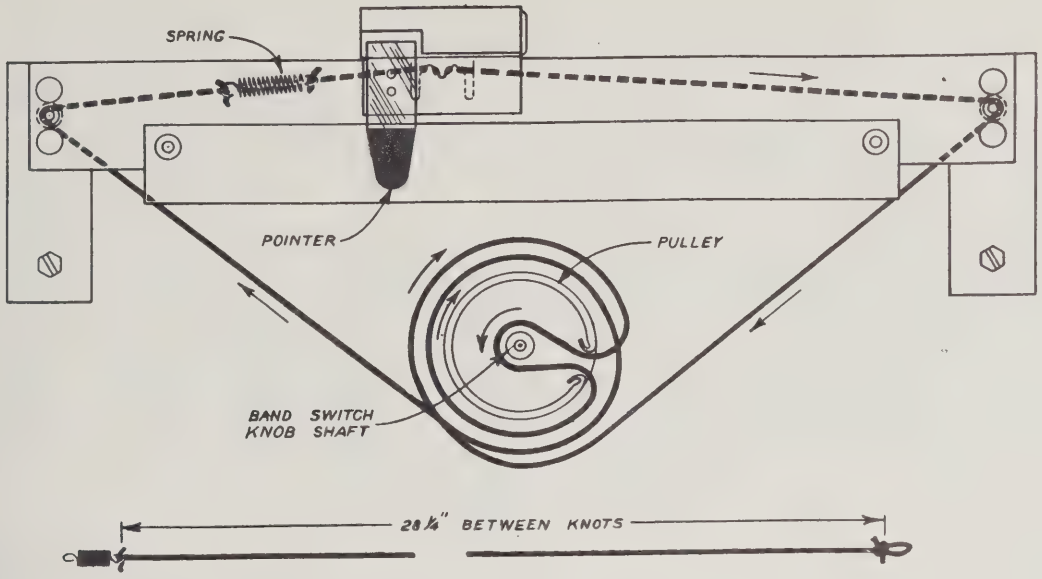
The horizontal size control L27 should be adjusted for a minimum picture width of 8½ inches. Any change in the adjustment of the horizontal size control will probably necessitate readjustment of the horizontal linearity controls. The horizontal linearity control R12 affects primarily the left side of the picture, the horizontal linearity coil L28 will have its major effect near the center of the picture, while the horizontal size control operates mainly on the right half of the picture. The adjustments should be made while receiving a test pattern or while using a cross-hatch generator.

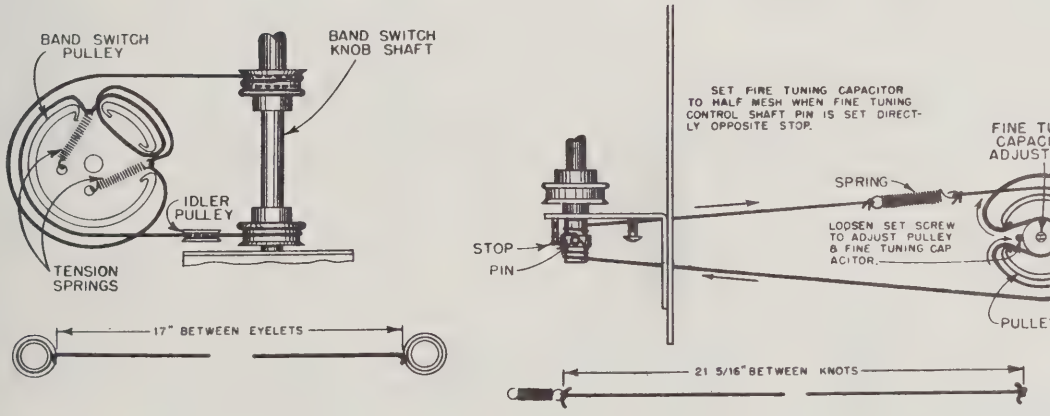
CHASSIS TOP VIEW–RIGHT SIDE



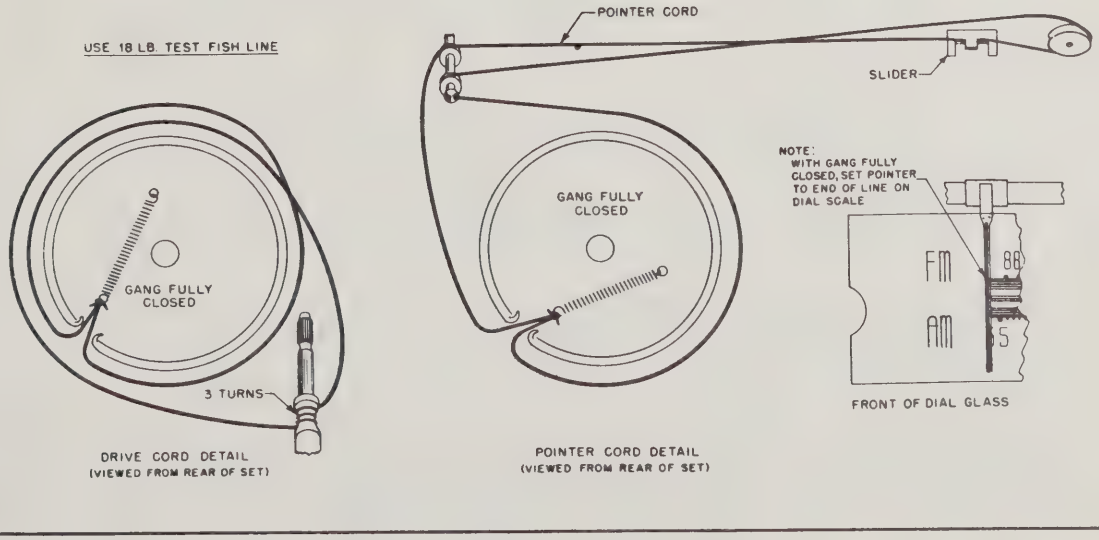
TV CHASSIS BOTTOM VIEW-TRANSFORMER INDUCTOR AND ALIGNMENT IDENTIFICATION

TV CHASSIS




BAND SWITCH PULLEY
BAND SWITCH KNOB SHAFT
IDLER PULLEY
TENSION SPRINGS
17" BETWEEN EYELETS
SET FIRE TUNING CAPACITOR TO HALF MESH WHEN FINE TUNING CONTROL SHAFT PIN IS SET DIRECTLY OPPOSITE STOP.
FINE TUNING CAPACITOR ADJUSTMENT
SPRING
LOOSEN SET SCREW TO ADJUST PULLEY & FINE TUNING CAPACITOR.
STOP PIN
PULLEY
21 5/16" BETWEEN KNOTS

AM-FM CHASSIS



DIAL CORD STRINGING

VOLTAGE AND RESISTANCE MEASUREMENTS

MEASUREMENTS TAKEN WITH RADIO-TELEVISION SWITCH IN TELEVISION POSITION AND BC-FM SWITCH IN FM POSITION UNLESS OTHERWISE STATED.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
V 1	6AG5	-1VDC	0V.	6.3VAC	0V.	130VDC	100VDC	0V.	-	-
V 2	6J6	105VDC	105VDC	0V.	6.3VAC	-3VDC	-.6VDC	0V.	-	-
V 3	6AG5	-1.1VDC	.5VDC	6.3VAC	0V.	135VDC	135VDC	.5VDC	-	-
V 4	6AG5	-1.1VDC	.5VDC	6.3VAC	0V.	135VDC	135VDC	.5VDC	-	-
V 5	6AG5	-1.1VDC	.5VDC	6.3VAC	0V.	30VDC	135VDC	.5VDC	-	-
V 6	6AG5	0V.	.6VDC	6.3VAC	0V.	30VDC	55VDC	.6VDC	-	-
V 7	6AL5	0V.	0V.	6.3VAC	0V.	.3VDC	0V.	-.2VDC	-	-
V 8	6AU6	-.7VDC	0V.	0V.	6.3VAC	105VDC	75VDC	.1VDC	-	-
V 9	6AC7	0V.	0V.	.4VDC	-.5VDC	.4VDC	155VDC	6.3VAC	220VDC	-
V 10	6BA6	0V.	0V.	0V.	6.3VAC	95VDC	95VDC	1.1VDC	-	-
V 11	6BA6	0V.	0V.	0V.	6.3VAC	95VDC	95VDC	1.2VDC	-	-
V 12	6AU6	-.3VDC	0V.	0V.	6.3VAC	45VDC	45VDC	0V.	-	-
V 13	6S8GT	-.6VDC	0V.	-.4VDC	-.3VDC	.1VDC	80VDC	6.3VAC	0V.	-.5VDC
V 14	6V6GT	0V.	0V.	195VDC#	275VDC#	0V.#	0V.#	6.3VAC	16VDC#	-
V 15	6SK7	0V.	0V.	0V.	-.7VDC	0V.	115VDC	6.3VAC	185VDC	-
V 16	6SH7	0V.	0V.	0V.	-1.6VDC	0V.	145VDC	6.3VAC	145VDC	-
V 17	6J5	0V.	0V.	100VDC	130VDC	-.5VDC	-3.6VDC	6.3VAC	0V.	-
V 18	6H6	0V.	6.3VAC	-4VDC	-2VDC	-6VDC	-2VDC	0V.	-1VDC	-
V 19	6AC7	0V.	0V.	0V.	-1VDC	.1VDC	85VDC	6.3VAC	180VDC	-
V 20	6V6GT	0V.	0V.	150VDC	220VDC	-18VDC	0V.	6.3VAC	0V.	-
V 21	6J5	0V.	0V.	37VDC	0V.	-33VDC	0V.	6.3VAC	0V.	-
V 22	6BE6-G	-48VDC	0V.	-48VDC	0V.	-60VDC	-48VDC	6.3VAC	230VDC	*
V 23	1B3GT			DO NOT MEASURE.						
V 24	5V4G	0V.	470VDC	0V.	400VDC	0V.	400VDC	0V.	470VDC	-
V 25	6SN7GT	-105VDC	215VDC	0V.	-105VDC	85VDC	0V.	0V.	6.3VAC	-
V 26	6V6GT	0V.	6.3VAC	215VDC#	215VDC#	0V.#	-105VDC	0V.	18VDC#	-
V 27	5U4G	0V.	400VDC	0V.	360VAC	0V.	360VAC	0V.	400VDC	-
V 28	5U4G	0V.	280VDC	0V.	365VAC	0V.	365VAC	0V.	280VDC	-
V 29	10BP4	See below								
## V 30	12AT7	145VDC	-.7VDC	0V.	6.2VAC	6.2VAC	65VDC	-.8VDC	0V.	Pin 9 0V.
## V 31	6BE6	0V.	1.6VDC	6.2VAC	0V.	180VDC	95VDC	95VDC	-	-
## V 32	6BA6	-.1VDC	0V.	0V.	6.2VAC	240VDC	100VDC	1.3VDC	-	-
## V 33	6BA6	0V.	0V.	0V.	6.2VAC	200VDC	100VDC	1.1VDC	-	-
## V 34	6T8	-1.2VDC	-.6VDC	-18VDC	6.2VAC	0V.	-.5VDC	0V.	-.5VDC	Pin 9 90VDC

	Tube	Pins 1	2	3	4	5	6	7	8	9	10	11	12
V	10BP4	0V.	.3VDC	0V.	0V.	0V.	0V.	0V.	0V.	0V.	250VDC	0V.	6.3VAC

*DO NOT MEASURE.
#MEASURED FROM NEGATIVE TERMINAL OF C1.
##TAKEN WITH RADIO TELEVISION SWITCH IN RADIO POSITION.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
V 1	6AG5	50KΩ	0Ω	.1Ω	0Ω	20KΩ†	85KΩ†	0Ω	-	-
V 2	6J6	12KΩ†	18KΩ††	0Ω	.1Ω	1 Meg.	15KΩ	0Ω	-	-
V 3	6AG5	12KΩ	47Ω	.1Ω	0Ω	7KΩ††	7KΩ††	47Ω	-	-
V 4	6AG5	4000Ω	47Ω	.1Ω	0Ω	7KΩ††	7KΩ††	47Ω	-	-
V 5	6AG5	4000Ω	47Ω	.1Ω	0Ω	22KΩ††	7KΩ††	47Ω	-	-
V 6	6AG5	.2Ω	220Ω	.1Ω	0Ω	55KΩ††	45KΩ††	220Ω	-	-
V 7	6AL5	.1Ω	180KΩ	.1Ω	0Ω	1.2 Meg.	0Ω	4000Ω	-	-
V 8	6AU6	2 Meg.	0Ω	0Ω	.1Ω	60KΩ†	220KΩ†	47Ω	-	-
V 9	6AC7	0Ω	0Ω	39Ω	560KΩ	39Ω	50KΩ†	.1Ω	3KΩ†	-
V 10	6BA6	47KΩ	0Ω	0Ω	.1Ω	8KΩ††	8KΩ††	68Ω	-	-
V 11	6BA6	47KΩ	0Ω	0Ω	.1Ω	8KΩ††	8KΩ††	68Ω	-	-
V 12	6AU6	27KΩ	0Ω	0Ω	.1Ω	10KΩ††	10KΩ††	0Ω	-	-
V 13	6S8GT	INF.	0Ω	100KΩ	100KΩ	180KΩ	1 Meg.†	.1Ω	0Ω	1 Meg.
V 14	6V6GT	0Ω	0Ω	5KΩ†	40KΩ†	470KΩ#	0Ω#	.1Ω	390Ω#	-
V 15	6SK7	0Ω	0Ω	0Ω	1 Meg.	0Ω	20KΩ†	.1Ω	6KΩ†	-
V 16	6SH7	0Ω	0Ω	0Ω	1 Meg.	0Ω	10KΩ†	.1Ω	16KΩ†	-
V 17	6J5	0Ω	0Ω	16KΩ†	12KΩ†	1 Meg.	850Ω	.1Ω	0Ω	-
V 18	6H6	0Ω	.1Ω	1.4 Meg.	440Ω	1.4 Meg.	450KΩ	0Ω	900KΩ	-
V 19	6AC7	0Ω	0Ω	0Ω	1.3 Meg.	10Ω	16KΩ	.1Ω	20KΩ†	-
V 20	6V6GT	0Ω	0Ω	5KΩ†	2.7KΩ†	57KΩ 27KΩ	INF.	.1Ω	12Ω	-
V 21	6J5	0Ω	0Ω	700KΩ††	INF.	220KΩ	INF.	.1Ω	0Ω	-
V 22	6BG6-G	1200Ω	0Ω	1200Ω	INF.	470KΩ	7000Ω 36KΩ	.1Ω	1200Ω 30KΩ	7.5KΩ††
V 23	1B3GT	INF.	INF.	INF.	INF.	INF.	INF.	INF.	INF.	7.5KΩ††
V 24	5V4G	INF.	7.5KΩ††	INF.	50Ω††	INF.	50Ω††	INF.	7.5KΩ††	-
V 25	6SN7GT	2.2 Meg. 3.2 Meg.	100KΩ†	0Ω	2.2 Meg. 3.2 Meg.	1.5 Meg.†† 3.5 Meg.††	0Ω	0Ω	.1Ω	-
V 26	6V6GT	0Ω	.1Ω	10KΩ†	10KΩ†	8.2 Meg.#	2.2 Meg.	0Ω	1200# 6200#	-
V 27	5U4G	INF.	11KΩ	INF	44Ω	INF.	49Ω	INF.	11KΩ	-
V 28	5U4G	INF.	4500Ω	INF.	1500Ω	INF.	1500Ω	INF.	4500Ω	-
V 29	10BP4	See Below								
## V 30	12AT7	16KΩ†	1 Meg.	0Ω	.1Ω	.1Ω	100KΩ†	1 Meg.	0Ω	Pin 9 0Ω
## V 31	6BE6	22KΩ	150Ω	.1Ω	0Ω	5KΩ†	20KΩ†	20KΩ†	-	-
## V 32	6BA6	3.5 Meg.	0Ω	0Ω	.1Ω	170Ω†	47KΩ†	100Ω	-	-
## V 33	6BA6	.8Ω	0Ω	0Ω	.1Ω	4700Ω†	33KΩ†	68Ω	-	-
## V 34	6T8	INF.	12KΩ	INF.	.1Ω	0Ω	1 Meg.	0Ω	10 Meg.	Pin 9 220KΩ†

	Tube	PINS 1	2	3	4	5	6	7	8	9	10	11	12
V 29	10BP4	0Ω	1.7 Meg.	INF.	INF.	INF.	INF.	INF.	INF.	INF.	170Ω†	0Ω	.1Ω

†MEASURED FROM PIN #8 of V28.
††MEASURED FROM PIN #8 of V27.
#MEASURED FROM NEGATIVE TERMINAL OF C1.
##TAKEN WITH RADIO-TELEVISION SWITCH IN RADIO POSITION.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative unless other wise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at maximum.
6. Where readings may vary according to the setting of the rear panel controls, both minimum and maximum readings are given.

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amplifier	6AG5	6AG5	7BD	
V2	Converter	6J6	6J6	7BF	
V3	1st Video & Sound IF Amp.	6AG5	6AG5	7BD	
V4	2nd Video IF Amp.	6AG5	6AG5	7BD	
V5	3rd " " "	6AG5	6AG5	7BD	
V6	4th " " "	6AG5	6AG5	7BD	
V7	Video Det., DC Rest. & Sync. Sep.	6AL5	6AL5	6BT	
V8	1st Video Amp.	6AU6	6AU6	7BK	
V9	2nd " "	6AC7	6AC7	8N	
V10	2nd Sound IF Amp.	6BA6	6BA6	7BK	
V11	3rd " " "	6BA6	6BA6	7BK	
V12	Limiter	6AU6	6AU6	7BK	
V13	Disc. & 1st AF Amp.	6S8GT	6S8GT		
V14	Audio Output	6V6GT	6V6GT	7AC	
V15	Sync. Stabiliz-ing Amp.	6SK7	6SK7	8N	
V16	Pulse Stripper	6SH7	6SH7	8BK	
V17	Pulse Limiter	6J5	6J5	6Q	
V18	AFC Disc.	6H6	6H6	7Q	
V19	AFC Control Tube	6AC7	6AC7	8N	
V20	Horizontal Osc.	6V6GT	6V6GT	7AC	
V21	Hor. Discharge	6J5	6J5	6Q	
V22	Hor. Output	6BG6-G	6BG6-G	5BT	
V23	H.V. Rectifier	1B3GT	1B3GT	3C	
V24	Hor. Damping	5V4G	5V4G	5L	
V25	Vert. Blocking Osc. & Discharge	6SN7GT	6SN7GT	8BD	
V26	Vert. Output	6V6GT	6V6GT	7AC	
V27	Low Voltage Rect.	5U4G	5U4G	5T	
V28	"	5U4G	5U4G	5T	
V29	Picture Tube	10BP4	10BP4		
V30	FM Converter	12AT7	12AT7	9A	
V31	BC Conv.-1st FM IF Amp.	6BE6	6BE6	7CH	
V32	2nd FM IF Amp.	6BA6	6BA6	7BK	Used on HS-108 and HS-137 chassis only.
V33	3rd FM IF Amp.	6BA6	6BA6.	7BK	
V34	AM Det.-Disc.-AVC-AF Amp.	6T8	6T8	9E	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	23A90029	AF88J	UP4445		S9803	◓ Filter
B	40	450						▲ "
C2A	40	450	23A90029	AF88J	UP4445		S9803	■ "
B	40	450						▲ "
C3A	10	450	23A90109	AF222J	UP11145		ELT-33	▲ "
B	10	450						■ Stab. Amp. Screen Pulse Lim. Decoup.
C	10	450						
C4A	100	100	23A90048	AF101010D4A	UP6C406		S9800	■ Bias 2nd AF Cath.
B	25	25						▲ Vert. Out. Cath.
C	50	25						
C5A	10	450	23A471277	AF2222J	UP111145	DY-4x10-450	ELT-36	■ Filter
B	10	450						▲ "
C	10	450						◓ 2nd V. Amp. Screen Video Low Pass Filter
D	10	450						
C6	5Ω @ 15,750~		23A90028		UP4A136		ELT-41	Hor. Def. Coupling
C7	12 @ 60~		23A90027		UP9A335		ELT-42	Vert. Def. Coupling
C8A	10	450	23A90109	AF222J	UP11145	DY-3x10-450	ELT-33	■ Vert. Out. Plate Decoup. Audio Out. Plate Decoup.
B	10	450						▲ Audio Screen Byp.
C	10	450						4th V. IF Plate Decoup.
C9	1	450	23A90049		BR145			1st V. Amp. Screen Byp.
C10	1	450	23A90049		BR145			

CAPACITORS (CONT.)

C83	50	500	21K77373	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap. -Cer.
C84	150	500	21R6506	1468-00015	5W5T15		1FM-315	Fixed Trimmer
C85	250	500	21K77375	1468-00025	5W5T25	MO.5-325	1FM-325	Diode Filter
C86	4700	500	21B470567	1467-005	1D5D5	MW.5-25	1FM-25	3rd IF Cath. Byp.
C87	4700	500	21B470567	1467-005	1D5D5	MW.5-25	1FM-25	3rd IF Screen Byp.
C88	4700	500	21B470567	1467-005	1D5D5	MW.5-25	1FM-25	3rd IF Plate Decoup.
C89	75		21K471763				1FM-475	RF Bypass
C90	250	500	21K77375	1468-00025	5W5T25	MO.5-325	1FM-325	AF Plate Bypass
C91	1000		21K471761	1468-001	1W5D1	MW.5-21	1FM-21	Diode Load Cap.
C92	1000		21K471761	1468-001	1W5D1	MW.5-21	1FM-21	" " "
C93	1000		21K471761	1468-001	1W5D1	MW.5-21	1FM-21	De-emphasis
C94	250			1468-00025	5W5T25	MO.5-325	1FM-325	Tone Compensation ‡
C95	4700	500	21B470567	1467-005	1D5D5	MW.5-25	1FM-25	" " †
C96	34		21K40161					Wave Trap "
C97	.05	100	8K471166	484-05	DT4S5	ST-4-05	TM-15	Video Coupling
C98	.05	400	8K471167	484-05	DT4S5	ST-4-05	TM-15	" "
C99	.05	400	8K471167	484-05	DT4S5	ST-4-05	TM-15	" "
C100	.1	400	8K471169	484-.1	DT4P1	ST-4-1	TM-1	Sync. Sep. Coupling
C101	.25	200	8A471356	484-.25	DT4P25	ST-2-25	TC-2	Bright Cont. Byp.-See Note 7
C102	.001	600	8B471160	684-001	DT6D1	ST-6-001	TM-21	De-emphasis
C103	.01	100	8K471163	484-01	DT4S1	ST-4-01	TM-11	Tone Compensation
C104	.05	100	8K471166	484-05	DT4S5	ST-4-05	TM-15	Audio Coupling
C105	.05	400	8K471167	484-05	DT4S5	ST-4-05	TM-15	" "
C106	.005	400	8K471161	684-005	DT6D5	ST-6-005	TM-25	Tone Comp.
C107	.005	600	8K471162	684-005	DT6D5	ST-6-005	TM-25	Output Plate Bypass
C108	.05	400	8K471167	484-05	DT4S5	ST-4-05	TM-15	Sync. Coupling
C109	.05	400	8K471167	484-05	DT4S5	ST-4-05	TM-15	" "
C110	.02	100	8K471164	484-02	DT4S2	ST-4-02	TM-12	Fixed Trimmer
C111	.005	400	8K471161	684-005	DT6D5	ST-6-005	TM-25	AFC Filter
C112	.005	400	8K471161	684-005	DT6D5	ST-6-005	TM-25	" "
C113	.005	400	8K471161	684-005	DT6D5	ST-6-005	TM-25	Hor. Osc. Grid
C114	.005	400	8K471161	684-005	DT6D5	ST-6-005	TM-25	AFC Coupling
C115	.02	100	8K471164	484-02	DT4S2	ST-4-02	TM-12	" "
C116	.05	400	8K471167	484-05	DT4S5	ST-4-05	TM-15	AFC Control Screen
C117	.005	400	8K471161	684-005	DT6D5	ST-6-005	TM-25	Hor. Coupling
C118	.05	400	8K471167	484-05	LT4S5	ST-4-05	TM-15	Hor. Output Screen
C119	.05	400	8K471167	484-05	DT4S5	ST-4-05	TM-15	Damper Filter
C120	.03	400	8K471163	484-03	DT4S3	ST-4-03	TM-13	" "
C121	.05	400	8K471167	484-05	DT4S5	ST-4-05	TM-15	Hor. Osc. Screen Byp.
C122	.01	400	8K471319	484-01	DT4S1	ST-4-01	TM-11	Vert. Coupling
C123	.005	400	8K471161	684-005	DT6D5	ST-6-005	TM-25	Integrator Network
C124	.005	400	8K471161	684-005	DT6D5	ST-6-005	TM-25	" "
C125	.05	400	8K471167	484-05	DT4S5	ST-4-05	TM-15	Vert. Discharge
C126	.05	400	8K471167	484-05	DT4S5	ST-4-05	TM-15	Vert. Coupling
C127	.01	600	8A471349	684-01	DT6S1	ST-6-01	TM-11	Line Filter
C128	.01	600	8A471349	684-01	DT6S1	ST-6-01	TM-11	" "
C129	.02	400	8S9802	484-02	DT4S2	ST-4-02	TM-12	FM Conv. Plate Decoup.
C130	.05	100	8A71213	484-05	DT4S5	ST-4-05	TM-15	AVC Filter
C131	.05	400	8K471635	484-05	DT4S5	ST-4-05	TM-15	1st IF Screen Byp.
C132	.02	400	8A471019	484-02	DT4S2	ST-4-02	TM-12	1st IF Plate Decoup.
C133	.01	100	8A25939	484-01	DT4S1	ST-4-01	TM-11	AVC Filter
C134	.02	400	8S9802	484-02	DT4S2	ST-4-02	TM-12	2nd IF Screen Bypass
C135	.02	400	8A471019	484-02	DT4S2	ST-4-02	TM-12	RF Bypass
C136	.02	400	8S9802	484-02	DT4S2	ST-4-02	TM-12	Audio Coupling
C137	.02	400	8S9802	484-02	DT4S2	ST-4-02	TM-12	" "
C138	.02	400	8S9802	484-02	DT4S2	ST-4-02	TM-12	" "
C139	5000	450	21A4707[illegible]	1467-005	1D5D5	MW.5-25	1FM-25	Fil. Bypass †
C140	.05	400	8K471635	484-05	DT4S5	ST-4-05	TM-15	Fil. Bypass

*May be a .25 MFD on Model VF102.
†Used on Model VK101.
‡Used on Model VF102.
Note 1-TS-3 chassis uses 40 MFD in this application.
Note 2-Not used in TS-3 chassis.
Note 3-Not used in TS-7 chassis.
Note 4-TS-3 and TS-5 chassis use 500MMFD in this application.
Note 5-Not used in TS-5 chassis.
Note 6-TS-3 used 70 MFD in this application.
Note 7-TS-3 uses 1 MFD in this application.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	REPLACEMENT DATA: IRC PART No.		NOTES
R1A	1 Meg.	½	18A475276		D14-137		Tone Control
B	Shaft				E		Attach to R1A per instructions
C	Switch				42		On-Off Switch DPST

PARTS LIST AND DESCRIPTIONS (Continued)

R69	100KΩ	½	6R6031	BTS-100K ±5%	Br.-Blk.-Yl.	Discriminator Load ± 5%
R70	100KΩ	½	6R6031	BTS-100K ±5%	Br.-Blk.-Yl.	" " ± 5%
R71	100KΩ	½	6R6031	BTS-100K ±5%	Br.-Blk.-Yl.	De-emphasis ± 5%
R72	33KΩ	½	6R6410	BTS-33K	Or.-Or.-Or.	Tone Compensation
R73	1 Meg.	½	6R6046	BTS-1 Meg.	Br.-Blk.-Grn.	1st AF Grid
R74	1 Meg.	½	6R6046	BTS-1 Meg.	Br.-Blk.-Grn.	1st AF Plate
R75	470KΩ	½	6R6377	BTS-470K	Yl.-Vi.-Yl.	2nd AF Grid
R76	4.7 Meg.	½	6R6449	BTS-4.7 Meg.	Yl.-Vi.-Grn.	Feedback-See Note 1
R77	390Ω	1	6R5598	BTA-390	Or.-Wh.-Br.	2nd AF Cathode-See Note 2
R78	39KΩ	2	6R5731	BT-2-39K	Or.-Wh.-Or.	2nd AF Screen-See Note 3 ± 5%
R79A	5000Ω	10	17A470722	AB-5000		Wire Wound Voltage Dropping ± 5%
B	2750Ω	10	17K482131	ABA-3000*		" " " " ± 5%
R80	1 Meg.	½	6R6046	BTS-1 Meg.	Br.-Blk.-Grn.	Stabilizing Amp. Grid
R81	5600Ω	1	6R5654	BTA-5600	Grn.-Blue-Red	Stabilizing Amp. Plate
R82	1 Meg.	½	6R6046	BTS-1 Meg.	Br.-Blk.-Grn.	Pulse Stripper Grid
R83	6800Ω	½	6R6428	BTS-6800	Blue-Gray-Red	Pulse Stripper Plate
R84	10KΩ	½	6R6320	BTS-10K	Br.-Blk.-Or.	Voltage Dropping ± 5%
R85	10KΩ	5	17K471284	AB-10K		" " ± 5%
R86	1 Meg.	½	6R6046	BTS-1 Meg.	Br.-Blk.-Grn.	Pulse Limiter Grid
R87	3900Ω	½	6R5659	BTS-3900	Or.-Wh.-Red	Pulse Limiter Plate-See Note 13
R88	1800Ω	½	6R2089	BTS-1800	Br.-Gray-Red	Pulse Limiter Plate-See Note 4
R89	470KΩ	½	6R6377	BTS-470K	Yl.-Vi.-Yl.	Diode Load
R90	470KΩ	½	6R6377	BTS-470K	Yl.-Vi.-Yl.	" "
R91	1 Meg.	½	6R6046	BTS-1 Meg.	Br.-Blk.-Grn.	Pulse Injection Load
R92	470KΩ	½	6R6377	BTS-470K	Yl.-Vi.-Yl.	AFC Grid
R93	560Ω	½	6R6291	BTS-560	Grn.-Blue-Br.	Control Tube Grid
R94	10Ω	½	6R5621	BW-½-10	Br.-Blk.-Blk.	AFC Cathode
R95	22KΩ	2	6R2098	BT-2-22K	Red-Red-Or.	AFC Plate
R96	39KΩ	2	6R5731	BT-2-39K	Or.-Wh.-Or.	AFC Screen
R97	27KΩ	1	6R6427	BTA-27K	Red-Vi.-Or.	Bleeder
R98	27KΩ	½	6R6434	BTS-27K	Red-Vi.-Or.	Horizontal Osc. Grid
R99	2700Ω	2	6R5764	BT-2-2700	Red-Vi.-Red	Horizontal Osc. Screen-See Note 18
R100	5000Ω	10	17K470703	AB-5000		Horizontal Osc. Plate
R101	6800Ω	½	6R6428	BTS-6800	Blue-Gray-Red	Differentiator
R102	220KΩ	½	6R6407	BTS-220K	Red-Red-Yl.	Hor. Discharge Grid
R103	680KΩ	½	6R6475	BTS-680K	Blue-Gray-Yl.	Hor. Discharge Plate
R104	6800Ω	½	6R6428	BTS-6800	Blue-Gray-Red	Peaking
R105	470KΩ	½	6R6377	BTS-470K	Yl.-Vi.-Yl.	Hor. Output Grid
R106	100Ω	2	6R3963	BT-2-100	Br.-Blk.-Br.	Hor. Output Cathode
R107	12KΩ	2	6R5766	BT-2-12K	Br.-Red-Or.	Hor. Output Screen-See Note 5
R108	3.9Ω	½	17K478256	BW-½-3.9 ±5%	Or.-Wh.-Gold	Hi. Voltage Rect. Filament-See Note 19 ± 5%
R109	820KΩ	1	6R2053	BTA-820K	Gray-Red-Yl.	Hi. Voltage Filter
R110	7500Ω	50	17A470704	EP-7500		Damping Network ± 5%
R111	22KΩ	½	6R6397	BTS-22K	Red-Red-Or.	Integrating Network
R112	6800Ω	½	6R6428	BTS-6800	Blue-Gray-Red	" "
R113	100KΩ	½	6R6031	BTS-100K	Br.-Blk.-Yl.	Vert. Block. Osc. Decoupling
R114	2.2 Meg.	½	6R6433	BTS-2.2 Meg.	Red-Red-Grn.	Vert. Block. Osc. Grid
R115	2200Ω	½	6R6069	BTS-2200	Red-Red-Red	Peaking
R116	1 Meg.	½	6R6046	BTS-1 Meg.	Br.-Blk.-Grn.	Vert. Discharge Plate
R117	270KΩ	½	6R6414	BTS-270K	Red-Vi.-Yl.	" " "
R118	270KΩ	½	6R6414	BTS-270K	Red-Vi.-Yl.	" " "
R119	8.2 Meg.	½	6R5585	BTS-8.2 Meg.	Gray-Red-Grn.	Vert. Output Grid
R120	1200Ω	1	6R5770	BTA-1200	Br.-Red-Red	Vert. Output Cathode
R121	18KΩ	2	6R476014	BT-2-18K	Br.-Gray-Or.	Voltage Dropping
R122	18KΩ	2	6R476014	BT-2-18K	Br.-Gray-Or.	" "
R123	5000Ω	20	17A470702	DG-5000		Voltage Divider Network ± 5%
R124	33KΩ	2	6R5768	BT-2-33K	Or.-Or.-Or.	" " "
R125	5000Ω	20	17A470702	DG-5000		" " " ± 5%
R126	33KΩ	2	6R5768	BT-2-33K	Or.-Or.-Or.	" " "
R127	5000Ω	20	17A470702	DG-5000		Bleeder ± 5%
R128	330KΩ	½	6R2096	BTS-330K	Or.-Or.-Yl.	Bias Network-See Note 6
R129	2700Ω	½	6R5577	BTS-2700	Red-Vi.-Red	" "
R130	27KΩ	1	6R6427	BTA-27K	Red-Vi.-Or.	" "
R131	1200Ω	½	6R6393	BTS-1200	Br.-Red-Red	" " -See Note 14
R132	470Ω	½	6R6090	BTS-470	Yl.-Vi.-Br.	" "
R133	270Ω	½	6R6432	BW-½-270	Red-Vi.-Br.	" "
R134	180Ω	½	6R5660	BW-½-180	Br.-Gray-Br.	" "
R135	1000Ω	10	17A470721	AB-1000		Bias Network ± 5%
R136	560Ω	1	6R5584	BTA-560	Grn.-Blue-Br.	" " -See Note 7
R137	1800Ω	10	17A471380	ABA-2000	Tapped @ 1200Ω	" "
R138	1 Meg.	½	6R6004	BTS-1 Meg.	Br.-Blk.-Grn.	FM Conv. Grid
R139	15KΩ	1	6R6431	BTA-15K	Br.-Grn.-Or.	FM Conv. Plate
R140	1 Meg.	½	6R6004	BTS-1 Meg.	Br.-Blk.-Grn.	FM Osc. Grid
R141	100KΩ	½	6R6075	BTS-100K	Br.-Blk.-Yl.	FM Conv. Decoupling
R142	22KΩ	½	6R6028	BTS-22K	Red-Red-Or.	AM Osc. Grid
R143	22KΩ	½	6R6028	BTS-22K	Red-Red-Or.	FM IF Shunt
R144	15KΩ	1	6R6013	BTA-15K	Br.-Grn.-Or.	Screen Dropping
R145	22KΩ	½	6R6028	BTS-22K	Red-Red-Or.	2nd IF Grid
R146	100Ω	½	6R6018		Br.-Blk.-Br.	2nd IF Cathode
R147	47KΩ	½	6R6086	BTS-47K	Yl.-Vi.-Or.	2nd IF Screen

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MOTOROLA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
T10	5750Ω	3.5Ω	450Ω	.5Ω	25B21175	A-3877	T22S46	A-2930	

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000∩)	MOTOROLA PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	
L1	200MA	42Ω	2.5 Henries	25B90014	C-2325	T20C55	C-2974	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	
L2	Ant. Trans. TV	0Ω	0Ω	1X470353		
L3	Mixer Fil.	0Ω		24A90064		
L4	1st IF	0Ω		24B90060		
L5	1st IF Fil.	0Ω		24A90064		
L6	1st IF Plate	0Ω		24B90060		
L7	Decoupling	0Ω		24A90064		
L8	H.F. Sound Trap	0Ω		24K90061		
L9	2nd IF Grid	0Ω		24B90060		
L10	2nd IF Fil.	0Ω		24A90064		Not Used in all Models
L11	2nd IF Plate	0Ω		24B90060		
L12	Sound Trap	0Ω		24K90061		
L13	3rd IF Grid	0Ω		24B90060		
L14	3rd IF Fil.	0Ω		24A90064		Not Used in all Models
L15	4th IF Grid	0Ω		24B90060		
L16	Low Freq. Trap	0Ω		24K90061		
L17	4th IF Fil.	0Ω		24A90064		Not Used in all Models
L18	Decoupling	0Ω		24A90064		
L19	Video Det. Input	0Ω		24B90060		
L20	Video Det. Fil.	0Ω		24A90064		Not Used in all Models
L21	Video Peak.	6Ω		24B90065		
L22	" "	9Ω		24K471304		
L23	" "	1.5Ω		24K90067		
L24	" "	4Ω		24K470783		
L25	" "	8Ω		24K471303		
L26	" "	6Ω		24K471302		
L27	Hor. Size	.1Ω		24B90119		
L28	Hor. Linearity	36Ω		24B470796		
L29	1st Sound IF Fil.	0Ω		24A90064		Not Used in all Models
L30	1st Sound IF	.1Ω		24B90004		
L31	2nd Sound IF Fil.	0Ω		24A90064		Not Used in all Models
L32	2nd Sound IF	.1Ω		24B90004		
L33	3rd Sound IF Fil.	0Ω		24A90064		Not Used in all Models
L34	Discrim.	0Ω	0Ω	24B471340		
L35	FM Ant.	0Ω				L35, L36 & L37 are Part of Tuning Assembly PT-17
L36	FM Osc.	0Ω				
L37	FM Var. IF	0Ω				
L38	Wave Trap	52Ω		24K478166		
L39	BC Ant.	46Ω	5Ω	24B471955		
L40	BC Osc.	1Ω	8.5Ω	24A470556	14-1040	
L41	1st FM IF	1Ω	1Ω	24B471720		
L42	2nd FM IF	1Ω	1Ω	24B471670		
L43	BC IF Input	9Ω	9Ω	24B471718		
L44	3rd FM IF	1Ω	1Ω	24B471672		
L45	BC IF Output	14Ω	14Ω	24B471520		
L46	Ratio Det.	5Ω	2Ω	24B471722		

R148	220KΩ	½	6R6015	BTS-220K	Red-Red-Yl.	AVC Network
R149	2.2 Meg.	½	6R3927	BTS-2.2 Meg.	Red-Red-Grn.	" "
R150	150Ω	½	6R3992		Br.-Grn.-Br.	1st FM IF Cathode
R151	4700Ω	½	6R6039	BTS-4700	Yl.-Vi.-Red	Voltage Dropping
R152	47KΩ	½	6R6056	BTS-47K	Yl.-Vi.-Or.	Diode RF Filter
R153	1 Meg.	½	6R6004	BTS-1 Meg.	Br.-Blk.-Grn.	Diode Load
R154	22KΩ	½	6R6028	BTS-22K	Red-Red-Or.	3rd IF Grid
R155	68Ω	½	6R2039		Blue-Gray-Blk.	3rd IF Cathode
R156	33KΩ	1	6R6400	BTA-33K	Or.-Or.-Or.	3rd IF Screen
R157	4700Ω	½	6R6039	BTS-4700	Yl.-Vi.-Red	3rd IF Decoupling
R158	330Ω	½	6R6010		Or.-Or.-Br.	Balancing
R159	68KΩ	½	6R6001	BTS-68K	Blue-Gray-Or.	De-emphasis
R160	5600Ω	½	6R6117	BTS-5600	Grn.-Blue-Red	Diode Load
R161	5600Ω	½	6R6117	BTS-5600	Grn.-Blue-Red	" "
R162	33KΩ	½	6R6012	BTS-33K	Or.-Or.-Or.	Tone Compensation-See Note 10
R163	10 Meg.	½	6R2109	BTS-10 Meg.	Br.-Blk.-Blue	1st AF Grid
R164	220KΩ	½	6R6015	BTS-220K	Red-Red-Yl.	1st AF Plate
R165	4700Ω	15	17K471958	DHA-5000		Bleeder-See Note 9
R166	470KΩ	½	6R6377	BTS-470K	Yl.-Vi.-Yl.	Tone Compensation-See Note 10
R167	180KΩ	½		BTS-180K	Br.-Gray-Yl.	Bias Network-See Note 20

*Set slider at 2750Ω.
Note 1-Used in Chassis Model TS-5 and TS-3 only.
Note 2-Chassis Model TS-7 uses 330Ω resistor in this application.
Note 3-Chassis Model TS-7 uses 22KΩ resistor in this application.
Note 4-Some models use 2200Ω in this application.
Note 5-Early productions used 10KΩ in this application.
Note 6-Chassis Model TS-7 uses 270KΩ in this application and TS-3 uses 33KΩ.
Note 7-Models using PM Type Ion Trap use 33Ω in this application.
Note 8-Set sliders @ 1200Ω and 1800Ω when using recommended IRC replacement.
Note 9-Set slider on IRC replacement @ 4700Ω.
Note 10-Not used in all models.
Note 11-TS-3 uses 2700Ω in this application.
Note 12-TS-3 uses 100KΩ in this application.
Note 13-TS-3 uses 4.7KΩ in this application.
Note 14-Not used in TS-3.
Note 15-TS-3 uses 100KΩ in this application.
Note 16-TS-3 uses 56KΩ in this application.
Note 17-TS-3 uses 330Ω in this application.
Note 18-TS-3 uses 10KΩ in this application.
Note 19-TS-3 uses 3.3Ω in this application.
Note 20-Used in TS-3 only.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
T1	1.34 Amp @ 117VAC	190MA. @730VAC	3 Amp. @ 5V AC	4.5 Amp. @6.1VAC	25C90026	P-8154*	T22R07	P-2955
T2	1.42 Amp @ 117VAC	200MA @730VAC	3 Amp. @ 5V AC	2 Amp. @ 5VAC	25C90025	P8154		
				SEC. 4 4.5 Amp. @6.3VAC				

*Do not use 5V AC-2Amp. Filament Winding.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA MOTOROLA PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.	NOTES
T3	48Ω tapped @ 25Ω	45Ω tapped @ 12Ω	24B470794				Horizontal Disc. Trans.
T4	180Ω	750Ω	25B90010	A-8121			Vert. Block. Osc.Trans.
T5	450Ω tapped @ 180Ω	10.6Ω tapped @ .6Ω	25C90052				Hor. Output Trans.
T6	600Ω	11Ω	25C9009	A-8115		A-4000	Vert. Output Trans.
T7A	65Ω		24C90118				Vert. Deflection Yoke
B	14Ω						Hor. Deflection Yoke
T8	385Ω		24B90031				Focus Coil
T9A	34Ω		24B90017				Ion Trap
B			24B484822				Permanent Magnet Type

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD RES.	VC IMP.				
SP1A	170Ω	3.5Ω	50C471235			8" Speaker-Model VK-101
B			50C480249			12" Speaker-Model VF-102
	CONE DIA.	VC DIA.				
SP2A	7-3/8"	9/16"	SOME MODELS MAY USE PM SPEAKER.			

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA MOTOROLA PART No.		NOTES
M1	Bayonet	6-8	.15	Brown	65X471122		Painted Green #47
M2	"	"	.20	White	65X4151		#51
M3	"	"	"	"	65X4151		#51
M4	"	"	"	"	65X4151		#51

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M5	Television Tuner TT-1	1X90300	
M6	FM-BC Tuner	PT-17	
M7	Voltage Regulator		NE-21
M8	Fuse	65K20404	3 Amp-250V
M9	"	65K20404	3 Amp-250V
M10	AM-FM Bandswitch	40B470432	
M11	Toggle Switch	40K478097	Double Pole, Double Throw
M12A	Rotary Switch	40A471967	2 Position, Radio-Television (HS-108 only)
B	" "		3 Position, Radio-Phono-Tele. (HS-137 only)
M13	Cable Assby.-Audio	1X471976	25 inch cable with 3 pin plug, (On AM-FM Chassis)
M14	" " -Power	1X471977	25 inch cable with octal plug (On AM-FM Chassis)
M15	" " -Audio	1X471385	2 Conductor Shielded Cable with 3 Pin Receptacle (On TV Chassis except TS-3)
M16	" " -Power	1X471383	Cable with Octal Socket (On TV chassis except TS-3)
M17	Fine Tuning Control	19A470383	
A51	High Band Trimmer	20A470148	Mica Trimmer 6-30 MMFD
A52	Channel #6 Trimmer	20A18355	" " 1.25-15 MMFD
A53	Channel #5 Trimmer	20A18355	" " 1.25-15 MMFD
A54	Channel #4 Trimmer	20A470148	" " 6-30 MMFD
A55	Channel #3 Trimmer	20A470148	" " 6-30 MMFD
A56	Channel #2 Trimmer	20K470384	" " 35-55 MMFD
A72	FM Osc. Trimmer	19A470426	Air Trimmer 2.2-30 MMFD
	Antenna Cable Assby.	1X471413	With plugs and terminal strip
	Knob-TV Controls	36B77213	2 Ring-Walnut Plastic
	" -TV Fine Tuning	36A471221	" " " "
	" -TV Channel Selector	36B471223	Walnut Plastic
	Knob-FM-BC Receiver	36K471324	3 Ring-No Dot
	" " "	36K471545	" " -With Dot
	" -TV Channel Selector	36K478249	Mahogany Plastic for VK101M
	Knob-TV Controls	36K478250	2 Ring-Mahogany Plastic for VK101M
	" -FM-BC Receiver	36K478251	3 Ring-No Dot-Mahogany Plastic for VK101M
	" - " " "	36K478252	" " With " " " " " "
	" -TV Fine Tuning Knob and Extension	36K478253	2 Ring-Mahogany Plastic for VK101M
		1X471436	For Side Control Adjustment
	Bank and Line Cord Assembly	1X480217	
	Line Cord Only	30K480201	With Plug and Receptacle
	Socket-Picture Tube	9B90116	12 Pin with leads.
	Core-Iron and Screw	46K471337	For L34
	" " " "	46K471143	For L28
	" " " "	46A70023	For all Video and Sound IF
	" " " "	46A470059	For Video Trap
	" " " "	46K471124	For T3-Bottom
	" " " "	46K471434	For L27
	" " " "	46A482139	For T3-Top
	Arm-Actuates Toggle Switch	45A471965	HS-108 and HS-137 chassis
	Arm and Bushing Assy.	1X471978	" " " "
	Dial Scale Glass	34C471490	" " " "
	Shaft-Bandswitch	47A470405	" " " "
	Spring-On Toggle Sw.	41A70705	" " " "

MOTOROLA MODELS VK101, VF102

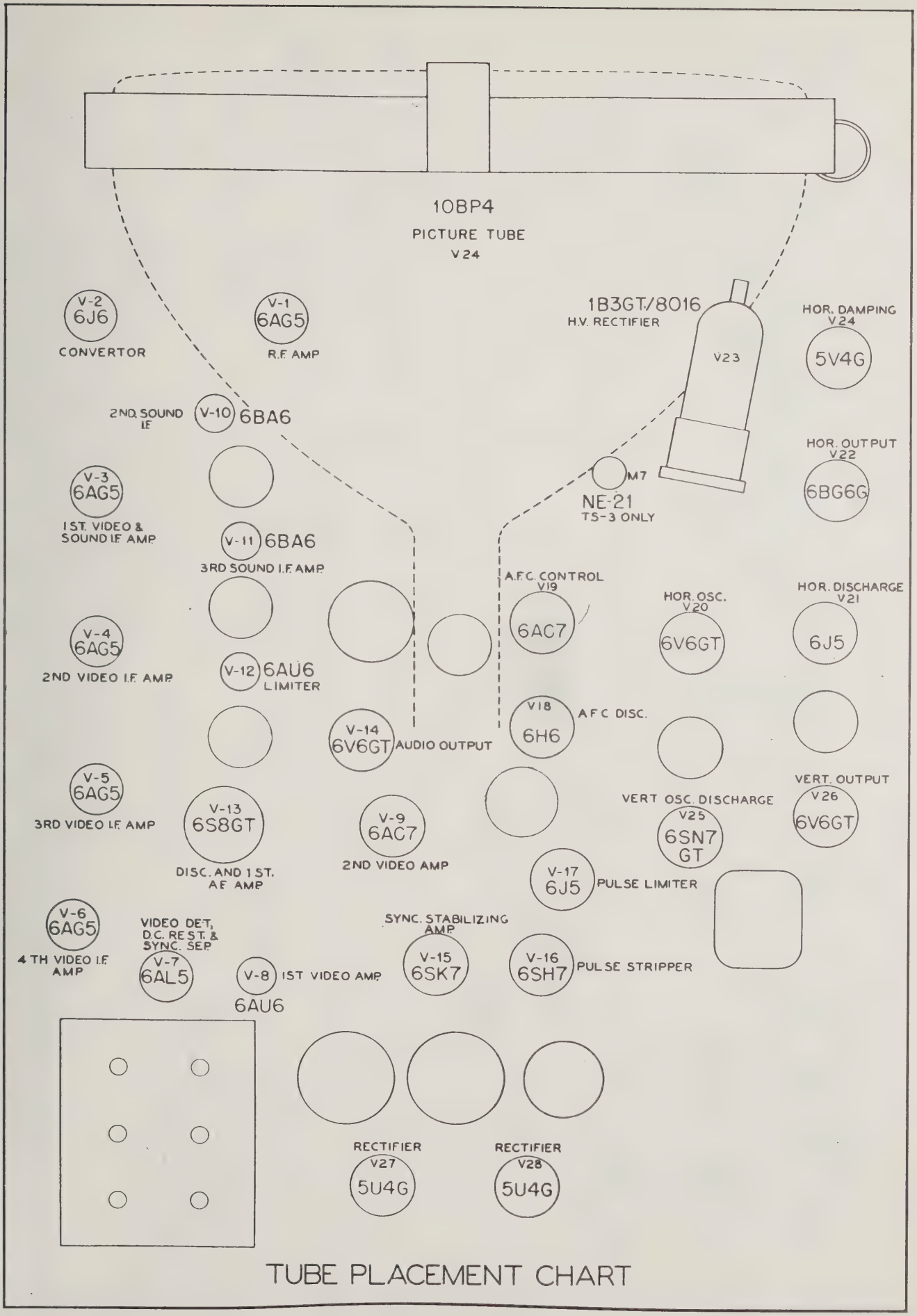
C11	5	150	23K471321	PRS150-8	BR815	M-8-150	UT-81	IF Gain Filter
C12	30	150	23A470782	PRS150-30	BR3015	M-30-150	UT-301	Hor. Output Cath.*
C13	1	450	23A90049		BR145			Vert. Blk. Plate Decoup.
C14	1	450	23A90049		BR145			Vert. Discharge Decoup.
C15	1	450	23A90049		BR145			" " "
C16	25	25	23A470023	PRS25-25	BR252A	M-25-25	TA-25	Bias Filter
C17	3-10	450	23A90109	AF222J	UP11145	DY-3x10-450	EL-310	Filter
C18	10	100	23K77635	PRS150-12	BR1215	M-10-150	UT-121	Stabilizing Cap.
C19	15	500	21R2736				MS-415	Fixed Trimmer-10%-See Note 1
C20	15	500	21R2736				MS-415	Fixed Trimmer-10%
C21	2		21K471216					Fixed Trimmer-Cer.-See Note 2
C22	2		21K471216					"
C23	7.5		21C470735					Fixed Trimmer-Cer.
C24	100		21K470736	1468-0001	5W5T1	MO.5-31	1FM-31	Ant. Coupling-Cer.
C25	1000	500	21K478410	1468-001	1W5D1	MW.5-21	1FM-21	RF Bypass-Cer.-Note 4
C26	1000	500	21K478410	1468-001	1W5D1	MW.5-21	1FM-21	RF Screen Byp.-Cer.-Note4
C27	100		21K470736	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling-Cer.
C28	1000	500	21K478410	1468-001	1W5D1	MW.5-21	1FM-21	RF Plate Decoup.-Cer.-See Note 4
C29	25		21A470738	1468-000025	5W5Q25		MS-425	RF Coupling-Cer.
C30	1.5		21K482296					Osc. Coupling-Cer.
C31	1000	500	21K478410	1468-001	1W5D1	MW.5-21	1FM-21	Fil. Bypass-Cer.-Note 4
C32	1000	500	21K478410	1468-001	1W5D1	MW.5-21	1FM-21	Osc. Plate Decoup.-Note 4
C33	25		21A470738	1468-000025	5W5Q25		MS-425	Osc. Grid Cap.-Cer.
C34	1.3		21A470737					Fixed Trimmer-Cer. 1MM
C35	25		21A470738	1468-000025	5W5Q25		MS-425	Osc. Feedback-Cer.
C36	1000	500	21K478410	1468-001	1W5D1	MW.5-21	1FM-21	Mixer Plate Decoup.-See Note 4
C37	25		21A470738					RF Coupling-Cer.
C38	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	IF Gain Filter-Cer.
C39	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Fil. Bypass " †
C40	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	" " " -See Note 2 and 5
C41	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	1st V. IF Decoup."
C42	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	RF Bypass Cer.
C43A	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Video IF Coupling. " †
B	250		21K482295	1468-00025	5W5T25	MO.5-325	1FM-325	" " " " ‡
C44	68		21K471128					Fixed Trimmer "
C45	68		21K471128					" "
C46	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	IF Gain Filter "
C47	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	2nd V. IF Decoup. "
C48	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	RF Bypass "
C49A	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Video IF Coupling. " †
B	250		21K482295	1468-00025	5W5T25	MO.5-325	1FM-325	" " " " ‡
C50	100		21K33224	1468-0001	5W5T1	MO.5-31	1FM-31	Fixed Trimmer "
C51	100		21K38224	1468-0001	5W5T1	MO.5-31	1FM-31	" "
C52	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	IF Gain Filter "
C53	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Fil. Bypass " †
C54	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	" " " " †
C55	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	3rd V. IF Decoup. "
C56A	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Video IF Coup. " †
B	250		21K482295	1468-00025	5W5T25	MO.5-325	1FM-325	" " " " ‡
C57	50		21K35392	1468-00005	5W5Q5	MO.5-45	1FM-45	Fixed Trimmer "
C58	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	4th V. IF Cath. Byp. "
C59	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	4th V. IF Decoup. "
C60	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Fil. Bypass " †
C61A	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Video IF Coupling " †
B	250		21K482295	1468-00025	5W5T25	MO.5-325	1FM-325	" " " " ‡
C62	7.5		21C470735					RF Bypass "
C63	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Meter Shunt "
C64	10		21A101778	1468-00001	5W5Q1		MS-41	Sound IF Coupling "
C65	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Fil. Bypass "
C66	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	2nd Sound IF Decoup. "
C67	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Fil. Bypass "
C68	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	3rd Sound IF Decoup. "
C69	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Fil. Bypass "
C70	5000	450	21A470789	1467-005	1D5D5	MW.5-25	1FM-25	Limiter Decoupling "
C71	25		21K28816	1468-000025	5W5Q25		MS-425	RF Bypass
C72	250	500	21R6662	1469-00025	5R5T25	MOS.5-325	MS-325	Sync. Coupling-10%
C73	250	500	21R6662	1469-00025	5R5T25	MOS.5-325	MS-325	" " " See Note 6
C74	2300		21A482128					Fixed Trimmer " ‡
C75	500	500	21R6639	1468-0005	5W5T5	MO.5-35	1FM-35	Differentiating Net.
C76	1000	500	21R6630	1464-001	2R5D1	MWS.5-21	MS-21	Hor. Coupling-10%
C77	500	500	21R6639	1468-0005	5W5T5	MO.5-35	1FM-35	Discharge Cap.
C78	500	10000	21A90013					H.V. Filter
C79	2000	500	21R6568	1464-002	1R5D2	MWS.5-22	MS-22	Vert. Osc. Grid-10%
C80	200	500	21R6629					Fixed Trimmer-Note 3
C81	250	500	21R2729	1469-00025	5R5T25	MOS.5-325	MS-325	Osc. Coupling-Silver
C82	250	500	21R2729	1469-00025	5R5T25	MOS.5-325	MS-325	RF Coupling "

R2A	1 Meg.	±	18A478275	AT-98	D13-137X	Volume Control (Television) tapped @ 300K
B	Shaft			KSS-3	E	Attach to R2A per instructions
R3A	100KΩ	±	18A90020	AM-49-S	D11-128	Brightness Control
B	Shaft			KSS-3	E	Attach to R3A per instructions
R4	30KΩ	±	18K470382			Contrast Control
R5	30Ω	2	18A90023			Vert. Centering-Tapped @ 15Ω
R6	100Ω	4	18A90017			Horizontal Centering
R7A	1 Meg.	±	18A90021	AM-61-S	D11-137	Vertical Hold
B	Shaft			KSS-3	E	Attach to R7A per instructions
R8A	2 Meg.	±	18A90022	AM-83-S		Vertical Size
B	Shaft			KSS-3		Attach to R8A per instructions
R9A	10KΩ	±	18A90055	AM-27-S	D11-116	Vertical Linearity
B	Shaft			KSS-3	E	Attach to R9A per instructions
R10	5000Ω	2	18A90024			Vertical Linearity
R11	30KΩ	±	18A90019			Horizontal Hold
R12	30KΩ	±	18A90019			Horizontal Linearity
R13	400Ω	8	18A478420			Focus Control-See Note
R14A	1 Meg.	±	18A471956	AT-98	D13-137X	Volume Control (Radio) tapped @ 300KΩ (HS-108)
B	Shaft			KSS-3	E	Attach to R14A per instructions
C	1 Meg.	±		AM-63-Z	D13-137	Volume Control (Radio) (HS-137)
D	Shaft			KSS-3	E	Attach to R14C per instructions

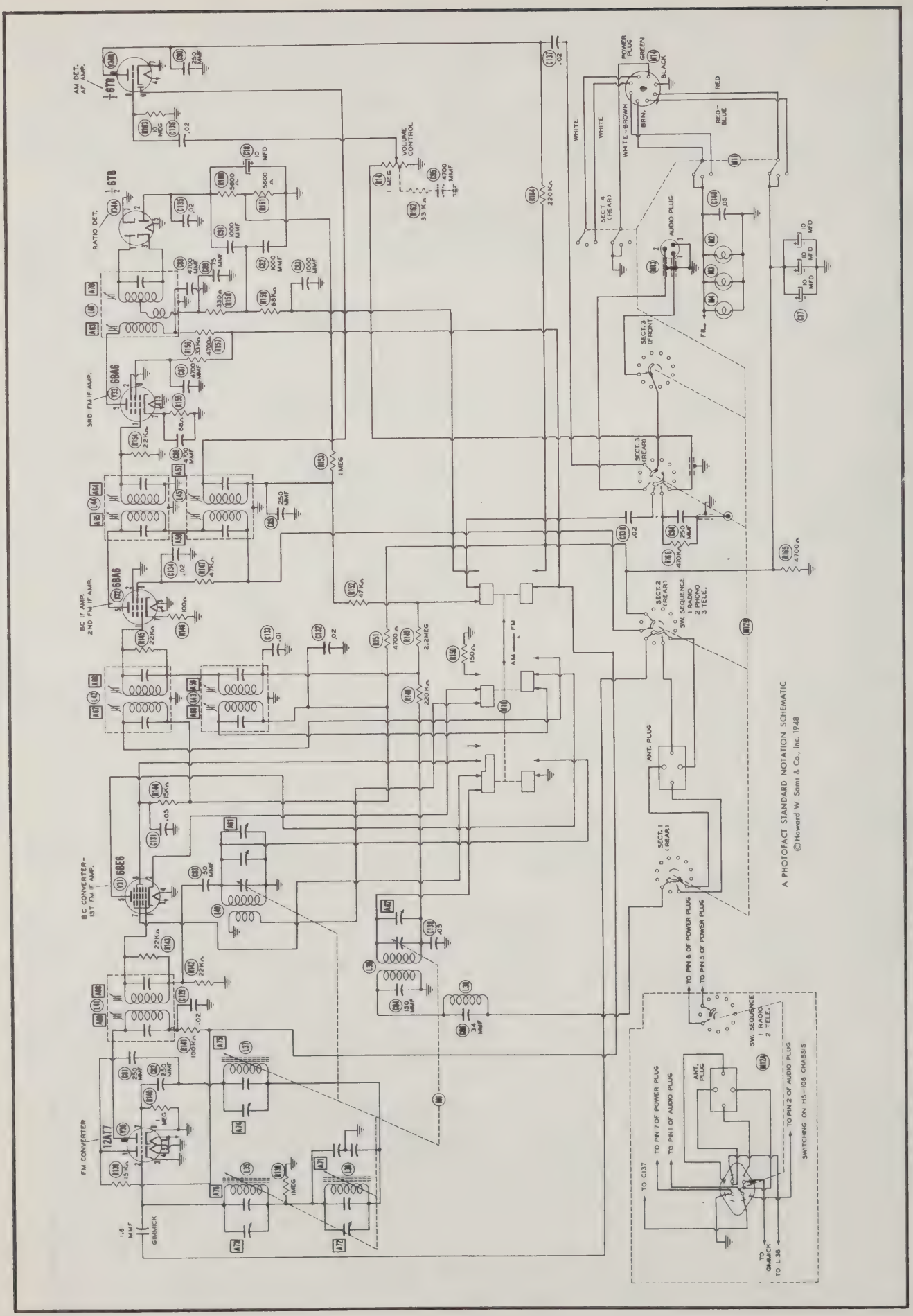
Note-Alternate Motorola Part Numbers are 18A90018 and 18A471392.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES	
			MOTOROLA	IRC	ALL RESISTORS 10% TOLERANCE UNLESS OTHERWISE STATED.	
	RESISTANCE	WATTS	PART No.	PART No.		
R15	220Ω	±	6R6270		Red-Red-Br.	Ant. Hi. Freq. Sec. Shunt
R16	390Ω	±	6R5554		Or.-Wh.-Br.	Ant. Lo. Freq. Sec. Shunt-Note 17
R17	47KΩ	±	6R6056	BTS-47K	Yl.-Vi.-Or.	RF Amp. Grid ± 20%
R18	82KΩ	1	6R5575	BTA-82K	Gray-Red-Or.	RF Amp. Screen
R19	18KΩ	2	6R476014	BT-2-18K	Br.-Gray-Or.	RF Amp. Plate
R20	2200Ω	±	6R6290	BTS-2200	Red-Red-Red	RF Amp. Plate Decoupling ± 20%
R21	470KΩ	±	6R6377	BTS-470K	Yl.-Vi.-Yl.	Mixer Grid
R22	470KΩ	±	6R6377	BTS-470K	Yl.-Vi.-Yl.	" "
R23	15KΩ	±	6R2119	BTS-15K	Br.-Grn.-Or.	Osc. Grid ± 20%
R24	3200Ω	±	6R2004	BTS-8200	Gray-Red-Red	Osc. Plate
R25	3900Ω	±	6R5659	BTS-3900	Or.-Wh.-Red	Osc. Plate Decoupling
R26	15KΩ	±	6R6477	BTS-15K	Br.-Grn.-Or.	Mixer Plate Decoupling
R27	8200Ω	±	6R2004	BTS-8200	Gray-Red-Red	1st Video IF Grid
R28	1000Ω	±	6R6301	BTS-1000	Br.-Blk.-Red	Bias Network ± 20%
R29	47Ω	±	6R5550		Yl.-Vi.-Blk.	1st Video IF Cathode
R30	2700Ω	±	6R5577	BTS-2700	Red-Vi.-Red	1st Video IF Decoupling
R31	18KΩ	±	6R5591	BTS-18K	Br.-Gray-Or.	Sound Trap Filter
R32	1000Ω	±	6R6301	BTS-1000	Br.-Blk.-Red	Bias Network
R33	10KΩ	±	6R6320	BTS-10K	Br.-Blk.-Or.	2nd Video IF Grid Loading
R34	47Ω	±	6R5550		Yl.-Vi.-Blk.	2nd Video IF Cathode
R35	2700Ω	±	6R5577	BTS-2700	Red-Vi.-Red	2nd Video Decoupling
R36	3900Ω	±	6R5659	BTS-3900	Or.-Wh.-Red	Sound Trap Filter
R37	1000Ω	±	6R6301	BTS-1000	Br.-Blk.-Red	Bias Network ± 20%
R38	47Ω	±	6R5550		Yl.-Vi.-Blk.	3rd Video IF Cathode
R39	15KΩ	±	6R6477	BTS-15K	Br.-Grn.-Or.	3rd Video IF Plate
R40	2700Ω	±	6R5577	BTS-2700	Red-Vi.-Red	3rd Video Decoupling
R41	220Ω	±	6R6270		Red-Red-Br.	4th Video IF Cathode
R42	10KΩ	1	6R6430	BTA-10K	Br.-Blk.-Or.	4th Video IF Plate
R43	39KΩ	1	6R5588	BTA-39K	Or.-Wh.-Or.	4th Video IF Decoupling
R44	3900Ω	±	6R5659	BTS-3900	Or.-Wh.-Red	Video Det. Load
R45	2.2 Meg.	±	6R6433	BTS-2.2 Meg.	Red-Red-Grn.	1st Video Amp. Grid
R46	47Ω	±	6R5550		Yl.-Vi.-Blk.	1st Video Amp. Cathode-See Note 10
R47	220KΩ	±	6R6407	BTS-220K	Red-Red-Yl.	1st Video Amp. Screen
R48	1800Ω	±	6R2089	BTS-1800	Br.-Gray-Red	1st Video Amp. Plate-See Note 11
R49	47KΩ	±	6R6048	BTS-47K	Yl.-Vi.-Or.	1st Video Amp. Plate-See Note 12
R50	560KΩ	±	6R5697	BTS-560K	Grn.-Blue-Yl.	2nd Video Amp. Grid
R51	39Ω	±	6R2085		Or.-Wh.-Blk.	2nd Video Amp. Cathode
R52	47KΩ	2	6R5736	BT-2-47K	Yl.-Vi.-Or.	2nd Video Amp. Screen
R53	3000Ω	2	6R476125	BT-2-3000	Or.-Blk.-Red	2nd Video Amp. Plate ± 5%
R54	47KΩ	±	6R6048	BTS-47K	Yl.-Vi.-Or.	Video Isolation-Note 18
R55	470KΩ	±	6R6377	BTS-470K	Yl.-Vi.-Yl.	Picture Tube Grid-See Note 15
R56	1 Meg.	±	6R6046	BTS-1 Meg.	Br.-Blk.-Grn.	DC Restorer Load
R57	33KΩ	±	6R6410	BTS-33K	Or.-Or.-Or.	Sync. Separator Load
R58	150KΩ	±	6R6398	BTS-150K	Br.-Grn.-Yl.	Bias Network-See Note 16
R59	47KΩ	±	6R6048	BTS-47K	Yl.-Vi.-Or.	2nd Sound Amp. Grid
R60	68Ω	±	6R2039		Blue-Gray-Blk.	2nd Sound Amp. Cathode
R61	3300Ω	2	6R2029	BT-2-3300	Or.-Or.-Red	2nd Sound Amp. Decoupling
R62	47KΩ	±	6R6048	BTS-47K	Yl.-Vi.-Or.	3rd Sound Amp. Grid
R63	68Ω	±	6R2039		Blue-Gray-Blk.	3rd Sound Amp. Cathode
R64	3300Ω	2	6R2029	BT-2-3300	Or.-Or.-Red	3rd Sound Amp. Decoupling
R65	27KΩ	±	6R6434	BTS-27K	Red-Vi.-Or.	Limiter Grid
R66	100Ω	±	6R6326	BW-½-100	Br.-Blk.-Br.	Voltage Divider Network
R67	6800Ω	±	6R6428	BTS-6800	Blue-Gray-Red	" " "
R68	10KΩ	2	6R6200	BT-2-10K	Br.-Blk.-Or.	" " "



TUBE PLACEMENT CHART


AM DET. AF AMP.
6T8
RATIO DET.
6T8
3RD FM IF AMP.
6BA6
2ND FM IF AMP.
6BA6
BC IF AMP.
6BA6
BC CONVERTER - 1ST FM IF AMP.
6BE6
FM CONVERTER
12AT7
VOLUME CONTROL
1 MEG
33 K
4700 MMF
220 K
AUDIO PLUG
POWER PLUG
GREEN
BLACK
RED
WHITE
WHITE
WHITE - BROWN
BRN.
RED - BLUE
SECT. 4 (REAR)
SECT. 3 (FRONT)
SECT. 3 (REAR)
SECT. 2 (REAR)
SECT. 1 (REAR)
SW. SEQUENCE 1 RADIO 2 PHONO 3 TELE.
ANT. PLUG
AM — FM
GIMMICK
1.8 MMF
TO PIN 6 OF POWER PLUG
TO PIN 5 OF POWER PLUG
TO PIN 7 OF POWER PLUG
TO PIN 1 OF AUDIO PLUG
TO C137
TO PIN 2 OF AUDIO PLUG
SWITCHING ON HS-108 CHASSIS
TO GIMMICK
TO L36
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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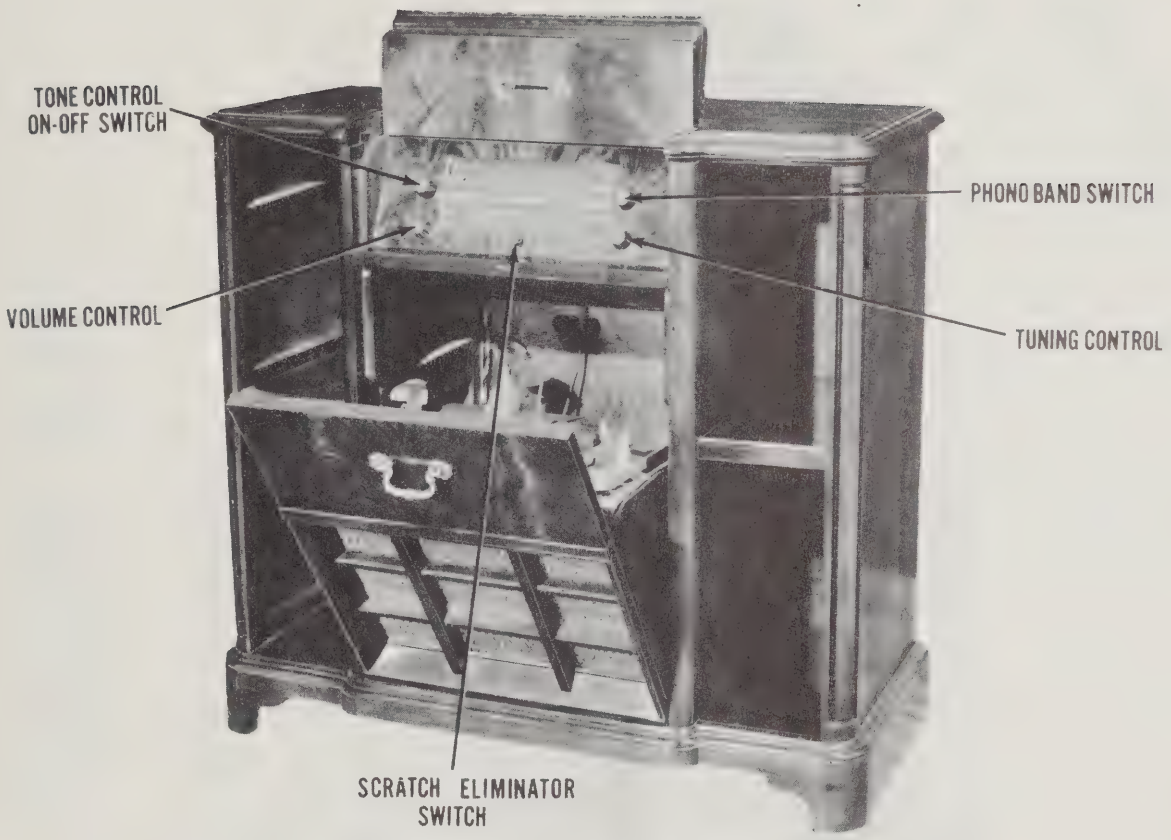
C43
5000 MMF
A2
L6
C40
5000 MMF
R30
2700Ω
C42
5000 MMF
5,750~
R13
27K
R130
1200Ω
R131
470Ω
R132
270Ω
R133
R134
180Ω
30Ω
R15
C7
1Ω
60~



PHILCO
MODEL 48-1286

PHILCO
MODEL 48-1286

PHILCO MODEL 48-1286

TRADE NAME	Philco, Model 48-1286
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	AC Operated Combination Phono-Radio AM-FM Superheterodyne Receiver with Loop Antenna
TUBES (ELEVEN)	Types, 6AU6 FM RF Amp., 7F8 AM-FM Converter, 6BA6 1st IF Amp., 7R7 FM 2nd IF-AM Det.-AVC, 7X7 FM Det.-AF Amp., 7E7 Rect.-Reactance Tube, 7F7 Scratch Amp., 6J5GT Phase Inv., (2) 6K6GT Power Output, 5AZ4 Rectifier.
POWER SUPPLY	105-120 Volts AC
RATING	.73 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1720KC FREQ. MOD. 88-108MC

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 7, Indiana

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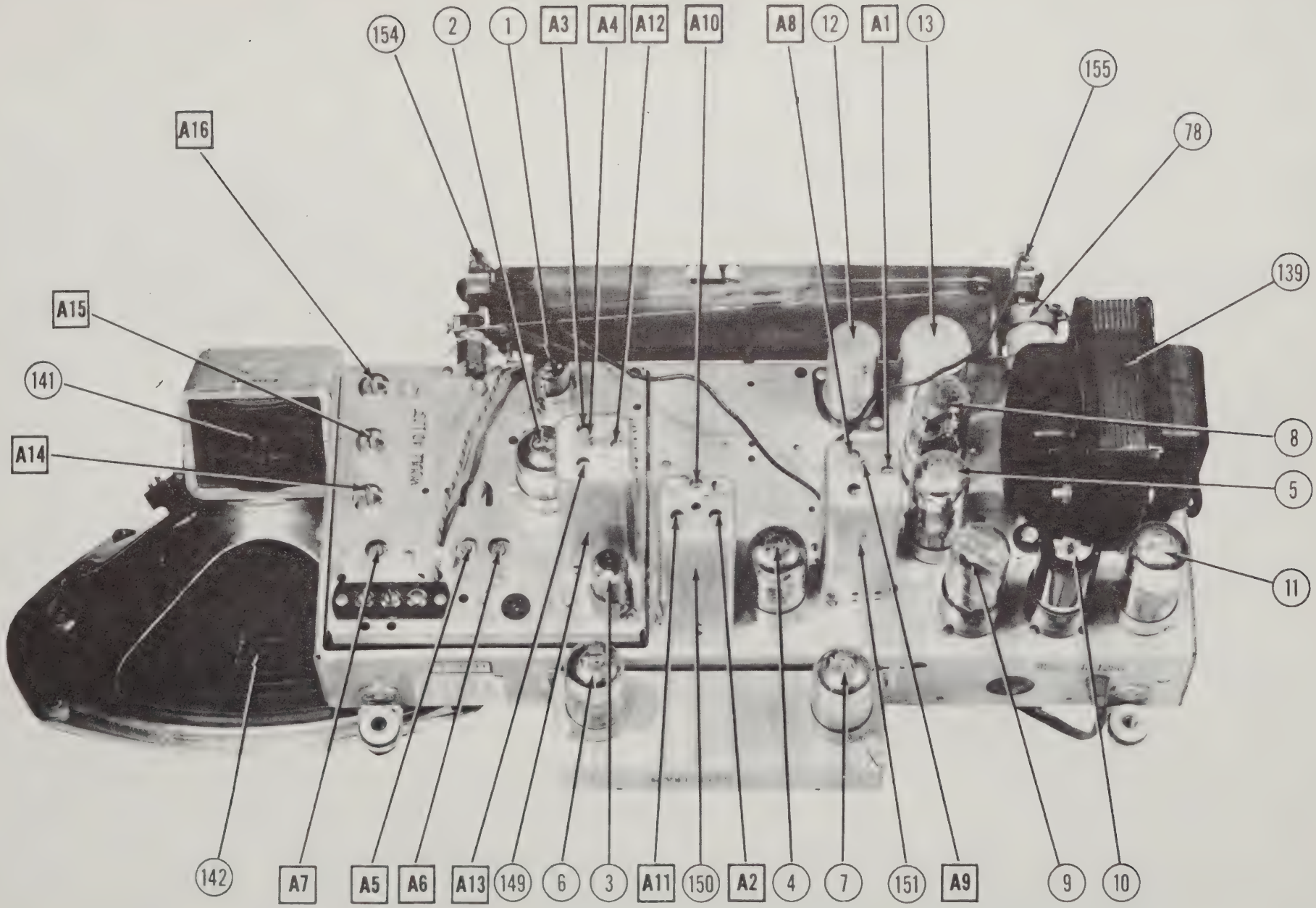
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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	FM RF Amp.	6AU6	6AU6	7BK	
2	AM-FM Conv.	7F8	7F8	8BW	
3	1st IF Amp.	6BA6	6BA6	7BK	
4	FM 2nd IF-AM Det.-AVC	7R7	7R7	8AE	
5	FM Det.-AF Amp.	7X7	7X7	8BZ	
6	Rect.-Reactance Tube	7E7	7E7	8AE	
7	Scratch Amp.	7F7	7F7	8AC	
8	Phase Inv.	6J5GT	6J5GT	6Q	
9	Power Output	6K6GT	6K6GT	7S	
10	" "	6K6GT	6K6GT	7S	
11	Rectifier	5AZ4	5AZ4		

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
12	20	450	30-2555	AF4J	UP2045	DY-20-450	5L-2	Filter
13A	25	450	30-2556	AF2222J*	UP111145*	DY-4x10-450*	D10078	▲ "
B	10	450						▲ Decoupling
14	2	50	30-2417-7		BR245			Stabalizing Cap.
15	.01	600	30-1226-1	684-01	GT6S1	MPH-6-01	TC-11	Line Filter
16	.01	600	30-1226-1	684-01	GT6S1	MPH-6-01	TC-11	" "
17	.003	1000	61-0017	1084-003	GT16D3	STM-16-003	TR-23	Output Plate Bypass
18	.006	400	45-3500-7	484-006	GT6D6	ST-6-006	TC-26	Audio Coupling
19	.006	400	45-3500-7	484-006	GT6D6	ST-6-006	TC-26	" "
20	.006	400	45-3500-7	484-006	GT6D6	ST-6-006	TC-26	" "
21	.01	400	60-0120	484-01	GT4S1	ST-4-01	TC-11	Tone Compensation
22	.006	400	45-3500-7	484-006	GT6D6	ST-6-006	TC-26	" "
23	.006	400	45-3500-7	484-006	GT6D6	ST-6-006	TC-26	Audio Coupling
24	.01	400	60-0120	484-01	GT4S1	ST-4-01	TC-11	Bias Filter
25	.02	400		484-02	GT4S2	ST-4-02	TC-12	" "
26	.03	400	30-4517	484-03	GT4S3	ST-4-03	TC-13	" "
27	.03	400	30-4517	484-03	GT4S3	ST-4-03	TC-13	Diode Filter
28	.01	400	60-0120	484-01	GT4S1	ST-4-01	TC-11	" "
29	.002	600	30-4622	684-002	GT6D2	ST-6-002	TC-22	Audio Coupling
30	.001	600	30-4620	684-001	GT6D1	ST-6-001	TC-21	" "
31	.006	400	45-3500-7	484-006	GT6D6	ST-6-006	TC-26	" "
32	.006	400	45-3500-7	484-006	GT6D6	ST-6-006	TC-26	" "
33	.05	400	61-0122	484-05	GT4S5	ST-4-05	TC-15	2nd IF Plate Decoup.
34	.01	400	60-0120	484-01	GT4S1	ST-4-01	TC-11	2nd IF Screen Bypass
35	.05	400	61-0122	484-05	GT4S5	ST-4-05	TC-15	2nd IF Cathode Byp.
36	.01	400	60-0120	484-01	GT4S1	ST-4-01	TC-11	1st IF Plate Decoup.
37	.01	400	60-0120	484-01	GT4S1	ST-4-01	TC-11	1st IF Screen Bypass
38	.01	400	60-0120	484-01	GT4S1	ST-4-01	TC-11	AVC Filter
39	.01	400	60-0120	484-01	GT4S1	ST-4-01	TC-11	" "
40	.01	400	60-0120	484-01	GT4S1	ST-4-01	TC-11	Conv. Decoupling
41	.01	400	60-0120	484-01	GT4S1	ST-4-01	TC-11	RF Bypass Pwr. Supply
42	.1	200	61-0113	484-.1	GT2P1	ST-2-1	TC-1	Bias Filter
43	.01	400	30-4641	484-01	GT4S1	ST-4-01	TC-11	RF Bypass Pwr. Supply
44	.008	400	30-4112	484-0075	GT16D8	STM-16-008	TR-28	Diode Load Cap.
45	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass
46	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	Tone Comp.
47	150	500	60-10155407	1468-00015	5W5T15	MO.5-315	1FM-315	Audio Coupling
48	330	500	60-10335407	1468-00035	5W5T3	MO.5-33	1FM-335	Audio Coupling
49	330	500	60-10335407	1468-00035	5W5T3	MO.5-33	1FM-335	Phase Shift Capacitor
50	100	300	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	De-emphasis-Cer.
51	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	" "
52	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	Tone Comp.-Silver
53	100	500	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter
54	100	300	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	" " " -Cer.
55	100	300	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass "
56	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass "
57	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	" " "
58	7.5	300	30-1224-8					RF Bypass "
59	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass "

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
111	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. Phase Inverter Grid
112	4700Ω	½	66-2473340	BTS-4700	Yl.-Vi.-Red Phase Inverter Cathode
113	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Phase Inverter Cathode
114	56KΩ	½	66-3563340	BTS-56K	Grn.-Blue-Or. Phase Inverter Plate Load
115	330KΩ	½	66-4333340	BTS-330K	Or.-Or.-Yl. Output Grid
116	330KΩ	½	66-4333340	BTS-330K	Or.-Or.-Yl. " "
117	150KΩ	½	66-4153340	BTS-150K	Br.-Grn.-Yl. Bias Filter
118	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Phono Shunt
119	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. Phono Shunt-See Note
120	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. Scratch Amp. Grid
121	2200Ω	½	66-2223340	BTS-2200	Red-Red-Red Scratch Amp. Cathode
122	220KΩ	½	66-4223340	BTS-220K	Red-Red-Yl. Scratch Amp. Plate Load
123	560KΩ	½	66-4563340	BTS-560K	Grn.-Blue-Yl. Scratch Amp. Grid
124	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. Scratch Amp. Plate Load
125	220KΩ	½	66-4223340	BTS-220K	Red-Red-Yl. Bias Network
126	560KΩ	½	66-4563340	BTS-560K	Grn.-Blue-Yl. " "
127	1.5 Meg.	½	66-5153340	BTS-1.5 Meg.	Br.-Grn.-Grn. " "
128	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	Or.-Or.-Grn. " "
129	220KΩ	½	66-4223340	BTS-220K	Red-Red-Yl. " "
130	220KΩ	½	66-4223340	BTS-220K	Red-Red-Yl. Scratch Rectifier Diode Load
131	680KΩ	½	66-4683340	BTS-680K	Blue-Gray-Yl. " " " "
132	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. Reactance Tube Grid
133	33KΩ	1	66-3334340	BTA-33K	Or.-Or.-Or. Reactance Tube Screen Dropping
134	33KΩ	1	66-3334340	BTA-33K	Or.-Or.-Or. Reactance Tube Screen Bleeder
135	18KΩ	1	66-3184340	BTA-18K	Br.-Gray-Or. Reactance Tube Plate Load
136	680KΩ	½	66-4683340	BTS-680K	Blue-Gray-Yl. Bias Network
137	680KΩ	½	66-4683340	BTS-680K	Blue-Gray-Yl. " "
138	15KΩ	2	66-3155340	BT-2-15K	Br.-Grn.-Or. Decoupling

Note-Not used in all models.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDARSON PART No.	REPLACEMENT DATA: CONNECT VTVM
139	117V AC @ .73A	680V CT @ .084ADC	5.2V AC @ 1.8A	6.6V AC @ 3.0A SEC. 4 6.7V CT @ .6A	32-8248	P-6170#	T22R32	P-3156#

#Drill new mounting holes. Add series resistor to reduce plate voltage.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDAR'N PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
140	8200Ω CT	3.7Ω	580Ω CT	.5Ω	32-8274	A-3824	T22S56	A-2936	*

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
	FIELD RES.	VC IMP.				
141	650Ω	3.7Ω	36-1611-3		12E60	
	CONE DIA.	VC DIA.				
142	11-1/2"	3/4"				

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
60	100	500	60-10105407	1468-0001	5W5T1	MO.5-31	1FM-31	IF Coupling
61	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass "
62	220	300		1468-00025	5W5T25	MO.5-325	1FM-325	2nd IF Grid Filter "
63	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass "
64	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass "
65	250	300		1468-00025	5W5T25	MO.5-325	1FM-325	Osc. Feedback "
66	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	Osc. Grid Cap. "
67	750	500	60-10755301	1468-00075	1W5T7	MO.3-37	1FM-37	Osc. Coupling "
68	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass "
69	250	300		1468-00025	5W5T25	MO.5-325	1FM-325	RF Coupling "
70	33	300	30-1224	1468-00004	5W5Q3	MO.5-43	MS-43	" " "
71	1500	300	62-215001011	1467-0015	1W5D15	MW.5-215	1FM-215	RF Plate Decoup. "
72	1500	300	62-215001011	1467-0015	1W5D15	MW.5-215	1FM-215	RF Byp. Pwr. Supply "
73	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	RF Cathode Byp. "
74	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	Fil. Bypass "
75	100	300	62-110009001	1468-0001	5W5T1	MO.5-31	1FM-31	RF Screen Byp. "
76	150	500	60-10155407	1468-00015	5W5T15	MO.5-315	1FM-315	Tone Comp.-See Note

*Parallel sections to obtain desired capacity.
Note-May not be used in all models.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	
77A	2 Meg.	½	33-5535-1	D18-139X	T-116	Volume Control tapped @ 1 Meg.
B	Shaft		Not Req.	A	Not Req.	Attach to 77A per instructions
78	6 Meg.	½	33-5538-1			Tone Control & Sw.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	
79	82Ω	½	66-0823340		Gray-Red-Blk. FM-RF Cathode
80	33KΩ	½	66-3333340	BTS-33K	Or.-Or.-Or. FM-RF Screen Dropping
81	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red FM-RF Plate Decoupling
82	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. Converter Grid
83	1500Ω	½	66-2153340	BTS-1500	Br.-Grn.-Red Converter Cathode
84	15KΩ	½	66-3153340	BTS-15K	Br.-Grn.-Or. Oscillator Grid
85	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. AVC Network
86	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Converter Plate Decoupling
87	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. AVC Network
88	68Ω	½	66-0683340		Blue-Gray-Blk. 1st IF Cathode
89	27KΩ	½	66-3273340	BTS-27K	Red-Vi.-Or. 1st IF Screen Dropping
90	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 1st IF Plate Decoupling
91	4700Ω	½	66-2473340	BTS-4700	Yl.-Vi.-Red Oscillator Plate Load
92	33KΩ	½	66-3333340	BTS-33K	Or.-Or.-Or. " " "
93	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. 2nd IF Grid
94	150Ω	½	66-1153340		Br.-Grn.-Br. 2nd IF Cathode
95	68KΩ	½	66-3683340	BTS-68K	Blue-Gray-Or. 2nd IF Screen Dropping
96	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 2nd IF Plate Decoupling
97	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
98	330KΩ	½	66-4333340	BTS-330K	Or.-Or.-Yl. Diode Load
99	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
100	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. " "
101	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. Tone Compensation
102	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. Series Test Terminal
103	6.8 Meg.	½	66-5683340	BTS-6.8 Meg.	Blue-Gray-Grn. FM Diode Load
104	100KΩ	½	66-4103340	BTS-100K	Br.-Blk.-Yl. De-emphasis
105	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Ratio Detector Diode Load
106	33KΩ	½	66-3333340	BTS-33K	Or.-Or.-Or. Tone Compensation
107	4.7Ω	½	66-9473340	BW-½-4.7	Yl.-Vi.-Gold Feedback
108	68Ω	½	66-0683340	BW-½-68	Blue-Gray-Blk. "
109	10 Meg.	½	66-6103340	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
110	220KΩ	½	66-4223340	BTS-220K	Red-Red-Yl. AF Plate Load

DATE 12/48-#4821-15 SET #41-FOLDER #15

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

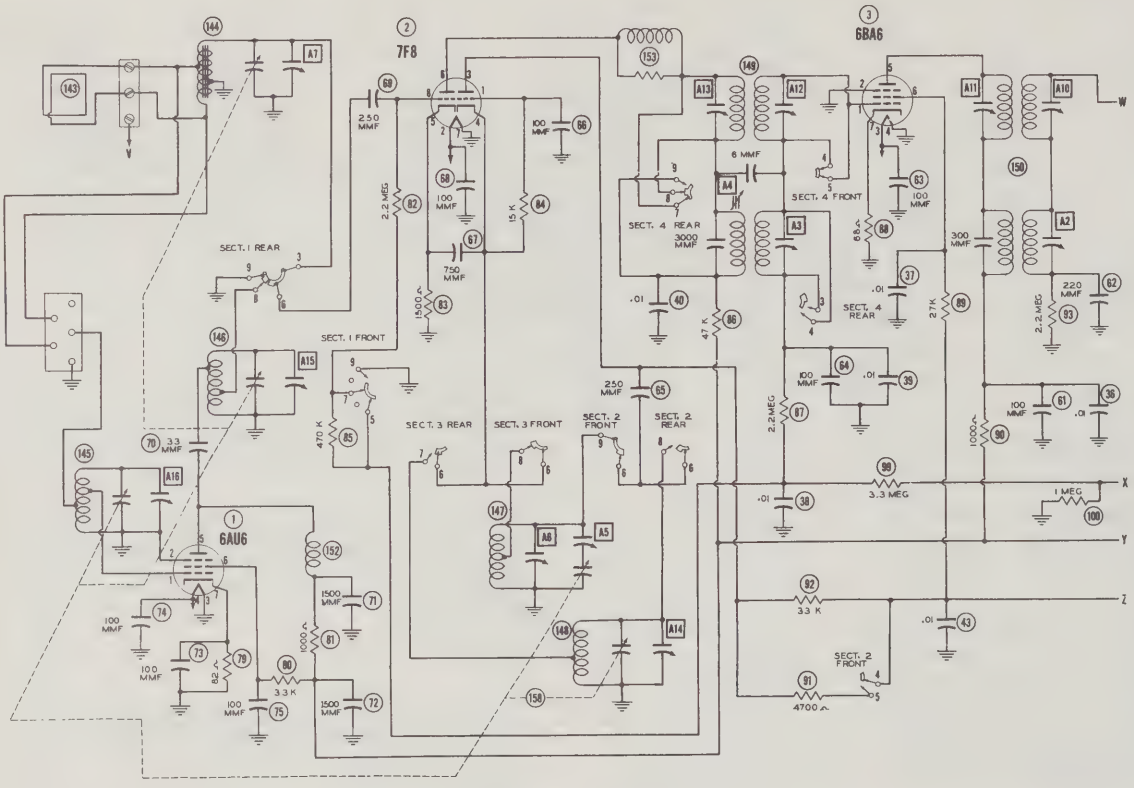
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	PHILCO PART No.	MEISSNER PART No.	
143	Loop Ant.		0Ω			
144	BC Ant.Coil		1.8Ω	32-4049-3		
145	FM " "		0Ω	32-4158		
146	FM RF "		0Ω	32-4159		
147	BC Osc. "		3.2Ω	32-4221	14-1060	
148	FM Osc. "		0Ω	32-4018-2		
149A	1st IF-AM	1.2Ω	20Ω	32-4146		
B	" " FM	1.2Ω	1.2Ω			
150A	2nd IF-AM	6Ω†	11Ω‡	32-4156		†Includes both primaries
B	" "-FM					‡Includes both secondaries.
151A	3rd IF AM	11Ω†	10Ω	32-4147		
B	FM Det.Tran.		1Ω			
152	RF Plate Choke		.1Ω	32-4061		
153	Par. Supp. Choke		0Ω	32-4157		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					PHILCO PART No.		
154	Bayonet	6-8	0.25	Blue	34-2064		Type #44
155	"	"	"	"	34-2064		" "

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
156	Switch	42-1848	Scratch Elim. On-Off
157	"	42-1803-1	Band-Phono
158	2 Gang Var. Cap.	31-2703-2	(18-514MMF) each section
A5	Trimmer Strip	31-6476-5	BC Osc. Adj. (Padder)
A6			" " "
A7	Trimmer	31-6473	BC Ant. Adj.
	Cabinet	10704	(Less Scale)
	Dial Scale	76-3187-1	
	Dial Pointer	56-3179FCP	
	Knob	54-4486	4 Required



VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.
RADIO-PHONO SWITCH IN PHONO POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
‡ 1	6AU6	0V.	0V.	0V.	6.6VAC	285VDC	170VDC	1VDC	-
‡ 2A	7F8	-.6VDC§	6.6VAC	175VDC	0V.	3.2VDC	180VDC	0V.	0V.
2B	7F8	-2.8VDC§	6.6VAC	90VDC	0V.	3.9VDC	160VDC	0V.	0V.
3	6BA6	0V.	0V.	0V.	6.6VAC	280VDC	100VDC	1VDC	-
4	7R7	0V.	290VDC	0V.	.2VDC	100VDC	0V.	.8VDC	6.6VAC
‡ 5	7X7	3.4VAC	170VDC	-6VDC	0V.	-.3VDC	-.6VDC	-.8VDC	3.4VAC
6	7E7	6.6VAC	150VDC	-.4VDC	-.6VDC	140VDC	-.4VDC	0V.	0V.
7	7F7	6.8VAC	1.6VDC	140VDC	0V.	-.6VDC	215VDC	0V.	0V.
8	6J5	0V.	3.4VAC	220VDC	58VDC	30VDC	0V.	3.4VAC	64VDC
9	6K6GT	0V.	6.6VAC	285VDC	290VDC	-21VDC	285VDC	0V.	0V.
10	6K6GT	0V.	6.6VAC	285VDC	290VDC	-21VDC	0V.	0V.	0V.
11	5AZ4	0V.	290VDC	0V.	340VAC	0V.	340VAC	-64VDC	280VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
‡ 1	6AU6	0Ω	0Ω	0Ω	.1Ω	300KΩ	330K	42Ω	-
‡ 2A	7F8	15KΩ	.1Ω	320K	0Ω	1.5KΩ	350KΩ	0Ω	2.4Meg.
2B	7F8	15KΩ	.1Ω	350KΩ	1Ω	1.5KΩ	350KΩ	0Ω	6.5Meg
3	6BA6	6.5 Meg.	0Ω	0Ω	.1Ω	300KΩ	340KΩ	68Ω	-
4	7R7	0Ω	300KΩ	1 Meg.	400KΩ	360KΩ	2.2 Meg.	1.0Ω	.1Ω
‡ 5	7X7	.05Ω	520KΩ	10 Meg.	0Ω	6.6 Meg.	47KΩ	6.6 Meg.	.05Ω
6	7E7	.1Ω	80KΩ	7.5 Meg.	5 Meg.	33KΩ	7.5 Meg.	0Ω	0Ω
7	7F7	.1Ω	2.2KΩ	260KΩ	1 Meg.	1 Meg.	150KΩ	0Ω	0Ω
8	6J5	0Ω	.05Ω	360KΩ	47KΩ	1 Meg.	900KΩ	.05Ω	52KΩ
9	6K6GT	INF.	.1Ω	300KΩ	300KΩ	1.2 Meg.	300KΩ	0Ω	0Ω
10	6K6GT	INF.	.1Ω	300KΩ	300KΩ	1.2 Meg.	INF.	0Ω	0Ω
11	5AZ4	INF.	300KΩ	INF.	750Ω	INF.	750Ω	650Ω	300KΩ

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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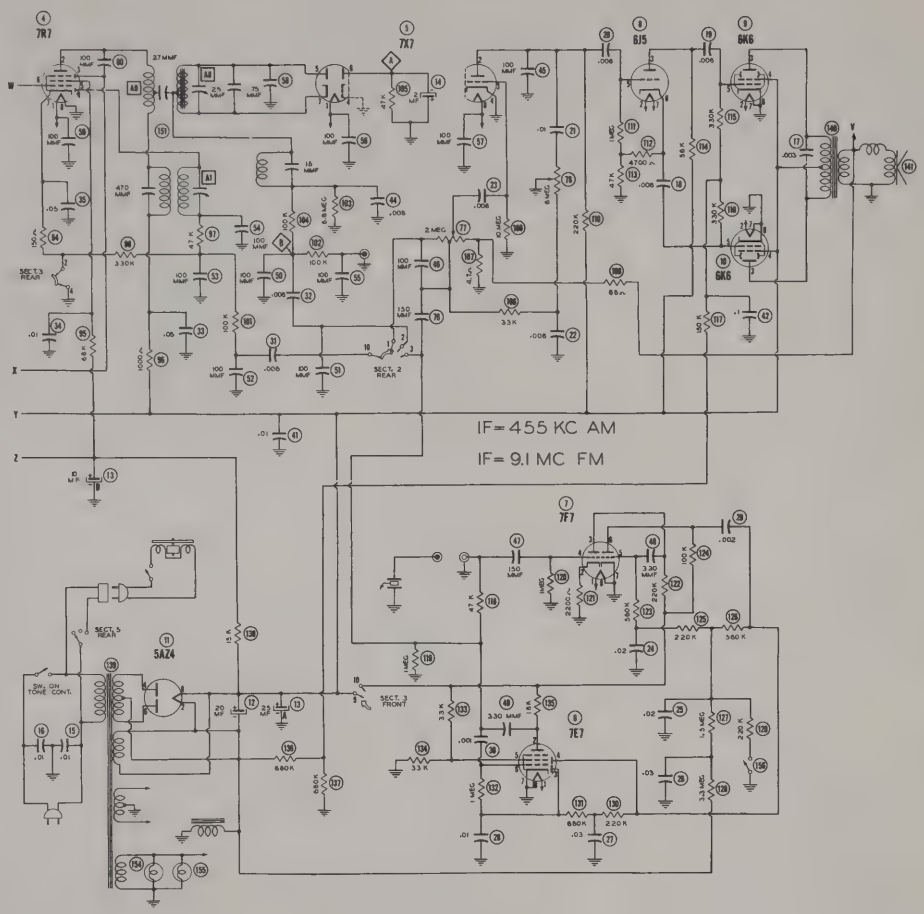

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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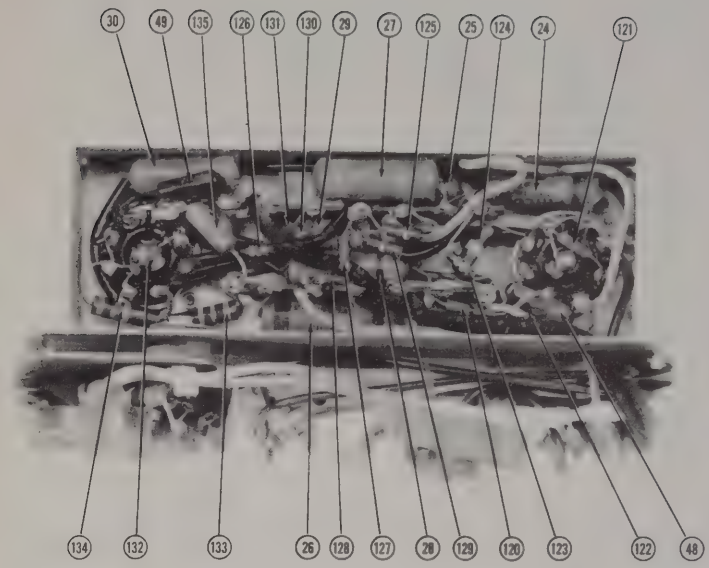
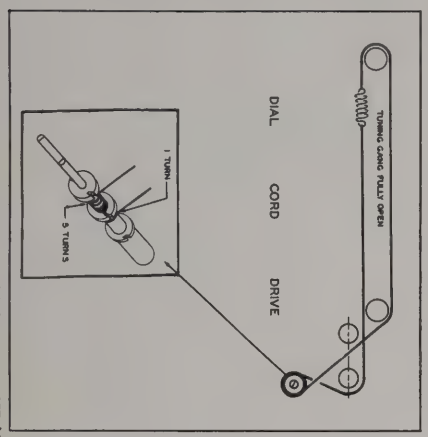
4821-15



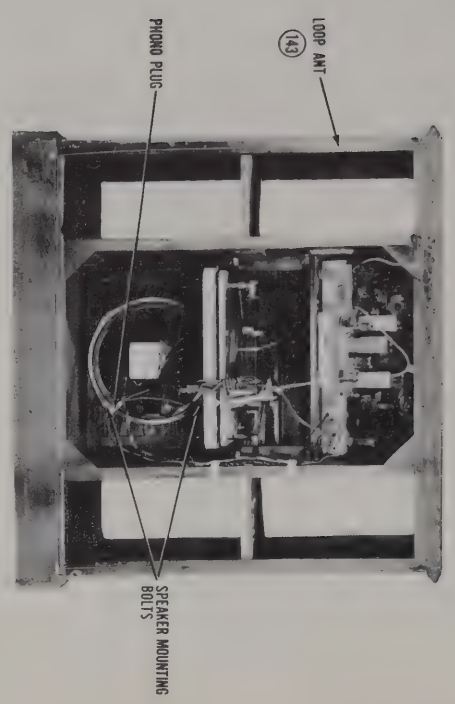
STAGE GAIN MEASUREMENTS		
ANTENNA TO CONVERTER GRID	10X	600KC
CONVERSION GAIN	12X	IN 600KC OUT 455KC
1st IF TRANSFORMER	3X	455KC
1st IF TUBE	10X	455KC
2nd IF TRANSFORMER	1.5X	455KC
2nd IF TUBE	230X	455KC
3rd IF TRANSFORMER	2X	455KC
1st AUDIO	45X	400 ∿
INVERTER	.8X	400 ∿
OUTPUT	18X	400 ∿
S.E. 1st AF	9X	400 ∿
S.E. 2nd AF	45X	400 ∿

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, typo of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by connecting negative (-) 3 volts to the AVC line.



DISASSEMBLY INSTRUCTIONS

1. Remove phono-motor plug from rear of tuner chassis. Disconnect phono pickup plug.
2. Remove AM antenna leads from terminal strip and remove FM antenna plug at rear of chassis.
3. Remove speaker plug at speaker. Remove speaker.
4. Remove five push-on type control knobs.
5. Remove four bolts from underneath chassis. Remove chassis.



DATE 12/48-#4821-15 SET #41-FOLDER #15

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Before FM Alignment is attempted, all AM alignment should be completed.
To set dial pointer turn tuning cap. fully closed and set pointer 2-7/16" from extreme left edge of dial backplate.
Allow sig. gen. and receiver to warm up for at least fifteen minutes before beginning alignment.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to terminal 1 of ant. terminal strip. Low side to chassis.	455KC	AM (Fully counter-clock-wise)	Tuning cap. fully closed	Across voice coil	A1,A2, A3,A4	Adjust for maximum output
2		Loop	580KC	"	Tune for max-imum output.	"	A5	Install receiver in cabi-net with cabinet loop connected. Fashion loop of several turns of wire and radiate signal into loop of receiver. Rock tuning cap. and adjust A5 for maximum output.
3		"	1700KC	"	6-3/8" from calibration mark.	"	A6	Adjust for maximum output
4		"	1500KC	"	Tune for max-imum output.	"	A7	Adjust for maximum output Repeat Steps 2, 3 & 4 un-til no further improve-ment can be made.

FM ALIGNMENT

In Step 5 of either type IF Alignment to gain access to Pin 1 grid of 1st Tube (3) slide a piece of wire or flattened solder through alignment slot on top of 1stIF can (Near A12). Connect sig. gen. to this wire.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR,VTVM & OUTPUT METER

Output of signal generator should be attenuated during alignment to maintain approximate meter deflection of 9 volts.
IF VTVM is not available, a20,000Ω/volt DC voltmeter may be used.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5	.1 MFD.	High side to grid of 6BA6 1st IF Tube (3).(See prealignment notes)	9.1MC (400 ∿ Amp. Mod.)	FM (Center-position	Tuning cap. fully closed	DC probe to Point A .Common to chassis	A8,A9, A10, A11	Adjust for maximum de-flection. After adjust-ments are satisfactory do not change any of these adjustments except for A8 in Step 7.
6	.1 MFD.	High side to Pin 8 (grid) of 7F8. Low side to chassis.	"	"	"	"	A12, A13	Adjust for maximum de-flection. After adjust-ments are satisfactory do not change either of these adjustments.
						OUTPUT METER		
7	.1 MFD.	High side to Pin 8 (grid) of 7F8. Low side to chassis.	9.1MC (400 ∿ Amp. Mod.)	FM (Center-position	Tuning cap. fully closed	Across voice coil	A8	Adjust for minimum output. Make this adjustment very carefully as misalign-ment will result in dis-tortion on FM reception. Continue with FM RF Align-ment in Step 8.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use freq. modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
5	.01 MFD	High side to grid of 6BA6 1st IF Tube (3).(See prealignment notes)	9.1MC (Freq. Mod.)	FM (Center-posi-tion)	Tuning cap. fully closed	Vertical input to Point A. Ground to chassis.	A9,A10 A11	Disconnect 2 MFD cap. (H) from Point A. Adjust A9, A10 & A11 for maxi-mum amplitude, symmetry and coincidence of pat-tern per Fig. 1. After adjustments are satis-factory do not change.
6	.01 MFD	High side to Pin 8 (grid) of 7F8. Low side to chassis.	"	"	"	"	A12, A13	Adjust for maximum ampli-tude, symmetry and coin-cidence of pattern per Fig. 1. After adjustments are satisfactory do not change. Reconnect cap. (H) to Point A.
7	.01 MFD	High side to grid of 6BA6 1st IF Tube (3).(See prealignment notes).	"	"	"	Vertical input to Point B. Ground to chassis.	A8	Adjust for maximum straightness of crossover lines with crossover oc-curring at center of pat-tern per Fig. 2. Continue with FM-RF Alignment in Step 8.

FM RF ALIGNMENT

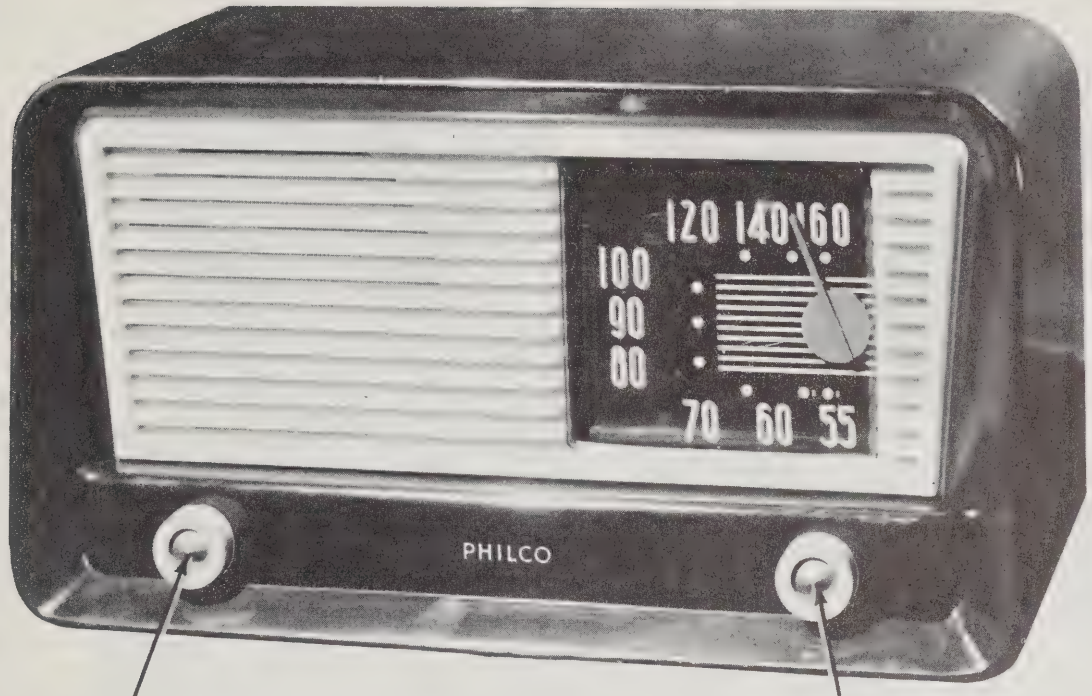
The FM Coils may be checked by the use of a tuning wand. If insertion of powdered iron end of wand increases deflection, compress the coil slightly. If insertion of the brass end of wand increases deflection, spread the coil slightly. Correct adjustment is indicated when insertion of either end of wand causes a decrease in deflection. Steps 8 through 11 should be repeated, in order, until no further improvement can be made making Step 9 the last step.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8	Direct	High side to Pin 4 of FM ant. socket. Low side to chassis.	105MC (400 ∿ Amp.Mod.)	FM (Center-position	5-1/16" from cali-bration mark A	DC probe to Point A .Common to chassis	A14	Adjust for maximum de-flection.
9	Direct	"	"	"	Tune for max-imum output.	"	A15, A16	Rock tuning cap. and ad-just for maximum deflec-tion.
10	Direct	"	92MC	"	92MC	"	FM Osc Coil (143)	Adjust per prealignment notes.
11	Direct	"	"	"	Tune for max-imum output.	"	FM RF Coil (146) FM Ant Coil (145)	Rock tuning cap. and ad-just per prealignment notes.

FIG. 1

FIG. 2

PHILCO
MODEL 49-902



PHILCO
MODEL 49-902

PHILCO MODEL 49-902

TRADE NAME	Philco, Model 49-902
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (SIX)	Types, 14AF7 Converter, 12BA6 1st IF Amp., 12AU6 2nd IF Amp., 14B6 Det.-AVC-AF, 35A5 Power Output, 35Y4 Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
TUNING RANGE—BROADCAST	540-1620KC RATING .23 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to ext. ant. terminal. Low side to B-.	455KC	Tuning cap. fully closed	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2		Loop	1600KC	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1500KC	Tune for maximum output.	"	A6	Adjust for maximum output.

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DATE 12/48-#4821-16 SET #51-FOLDER #16

PARTS LIST AND DESCRIPTIONS

PHILCO MODEL 49-902

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	14AF7	14AF7	8AC	
2	1st IF Amp.	12BA6	12BA6	7BK	
3	2nd IF Amp.	12AU6	12AU6	7BK	
4	Det.-AVC-AF	14B6	14B6	8W	
5	Power Output	35A5	35A5	6AA	
6	Rectifier	35Y4	35Y4	5AL	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	40	150	30-2575-27	PRSA150/40-30	EZ44315C*	DSB-403020-150	TA-303	Filter-Orange
B	30	150						" -Blue
C	30	150		PRS150/30				" -Red
8	.04	400	45-3500-2	484-05	GT6S4	ST-6-04	TC-14	Line Filter
9	.1	400	30-4644-1				72P2	Line Isolation-See Note
10	.02	400	61-0108	484-02	GT4S2	ST-4-02	TC-12	Output Plate Bypass
11	.01	400	61-0120	484-01	GT4S1	ST-4-01	TC-11	Audio Coupling
12	.01	400	61-0120	484-01	GT4S1	ST-4-01	TC-11	" "
13	.05	200	61-0122	484-05	GT2S5	ST-4-05	TC-15	2nd IF Decoupling
14	.05	200	61-0122	484-05	GT2S5	ST-4-05	TC-15	1st IF Screen Bypass
15	.001	600	45-3500-5	684-001	GT6D1	ST-6-001	TC-21	1st IF Cathode Bypass
16	.01	600	61-0120	684-01	GT6S1	ST-6-01	TC-11	Conv. Plate Decoup.
17	.1	400	61-0113	484-.1	GT4P1	ST-4-1	TC-1	AVC Filter
18	.05	200	61-0122	484-05	GT2S5	ST-4-05	TC-15	Conv. Cathode Bypass
19	.05	400	30-4518	484-05	GT4S5	ST-4-05	TC-15	Osc. Tuning Cap. Iso.
20	.0015	600	45-3500-6	684-001	GT6D1	ST-6-001	TC-21	Ext. Ant. Isolation
21	220	300	62-122001001	1468-00025	5W5T25	MO.5-325	1FM-325	Output Grid Bypass-Cer.
22	220	300	62-122001001	1468-00025	5W5T25	MO.5-325	1FM-325	IF Coupling-Cer.
23	220	300	62-122001001	1468-00025	5W5T25	MO.5-325	1FM-325	Osc. Coupling-Cer.
24	220	300	62-122001001	1468-00025	5W5T25	MO.5-325	1FM-325	Osc. Grid Cap.-Cer.
25	220	300	62-122001001	1468-00025	5W5T25	MO.5-325	1FM-325	RF Coupling "

#Omit bypass section.
Note-Special resonant capacitor.

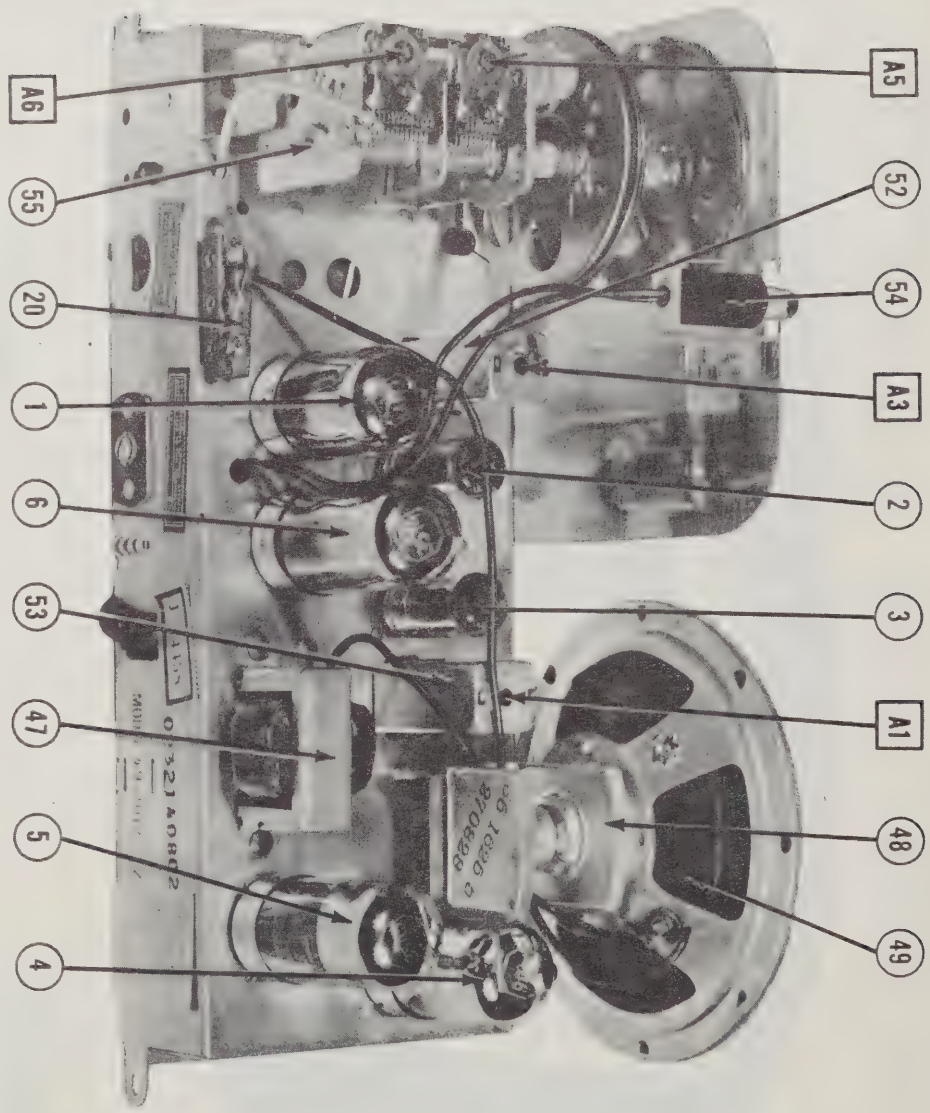
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
26A	500KΩ	½	45-5019	D13-133	M-60-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 26A per instructions
C	Switch		" "	41	SW-A	" " " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	IDENTIFICATION CODES
27	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. Converter Grid
28	2200Ω	½	66-2223340	BTS-2200	Red-Red-Red Converter Plate Decoupling
29	2200Ω	½	66-2223340	BTS-2200	Red-Red-Red Converter Cathode
30	10KΩ	½	66-3103340	BTS-10K	Br.-Blk.-Or. Oscillator Plate Load
31	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Oscillator Grid
32	220Ω	½	66-1223340	BW-½-220	Red-Red-Br. 1st IF Cathode
33	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. 1st IF Screen Dropping
34	15KΩ	½	66-3153340	BTS-15K	Br.-Grn.-Or. 1st IF Plate Load
35	150KΩ	½	66-4153340	BTS-150K	Br.-Grn.-Yl. 2nd IF Grid
36	120Ω	½	66-1123340	BW-½-120	Br.-Red-Br. 2nd IF Cathode
37	1000Ω	½	66-2103340	BTS-1000	Br.-Blk.-Red 2nd IF Decoupling
38	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
39	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	Or.-Or.-Grn. AF Grid
40	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. AF Plate Load
41	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. Output Grid
42	130Ω	½	66-1133340	BW-½-120	Br.-Or.-Br. Output Cathode
43	1200Ω	½	66-2124340	BTS-1200	Br.-Red-Red Filter
44	220Ω	1	66-1225340	BW-1-220	Red-Red-Br. "
45	150KΩ	½	66-4153340	BTS-150K	Br.-Grn.-Yl. Line Isolation
46	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PHILCO PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
47	2450Ω	3.4Ω	240Ω	.5Ω	32-8310-3	A-3876	T22845	A-2928	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			PHILCO PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD RES.	VC IMP.		ST-105†		†Drill and tap magnet frame.
48	PM	3.4Ω	36-1625	Mod. P5-X	5A15†	
	CONE DIA.	VC DIA.				
49	4½"	9/16"				

R F COILS

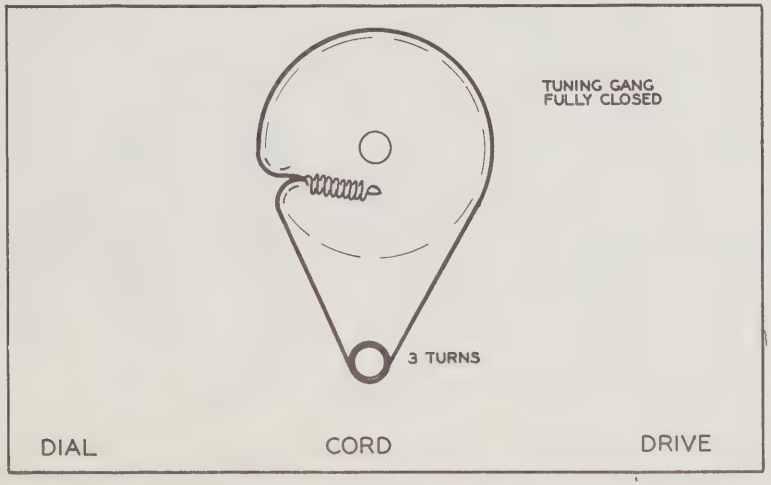
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	PHILCO PART No.	MEISSNER PART No.	
50	Loop Ant.	.5Ω	3.5Ω	32-4052-25	14-1060	
51	Osc. Coil		7.2Ω	45-7502		
52	Input IF	8.5Ω*	19Ω	32-4258		*20Ω Tertiary Winding
53	Output IF	16.5Ω	16Ω	32-4240-3		

DIAL LIGHT

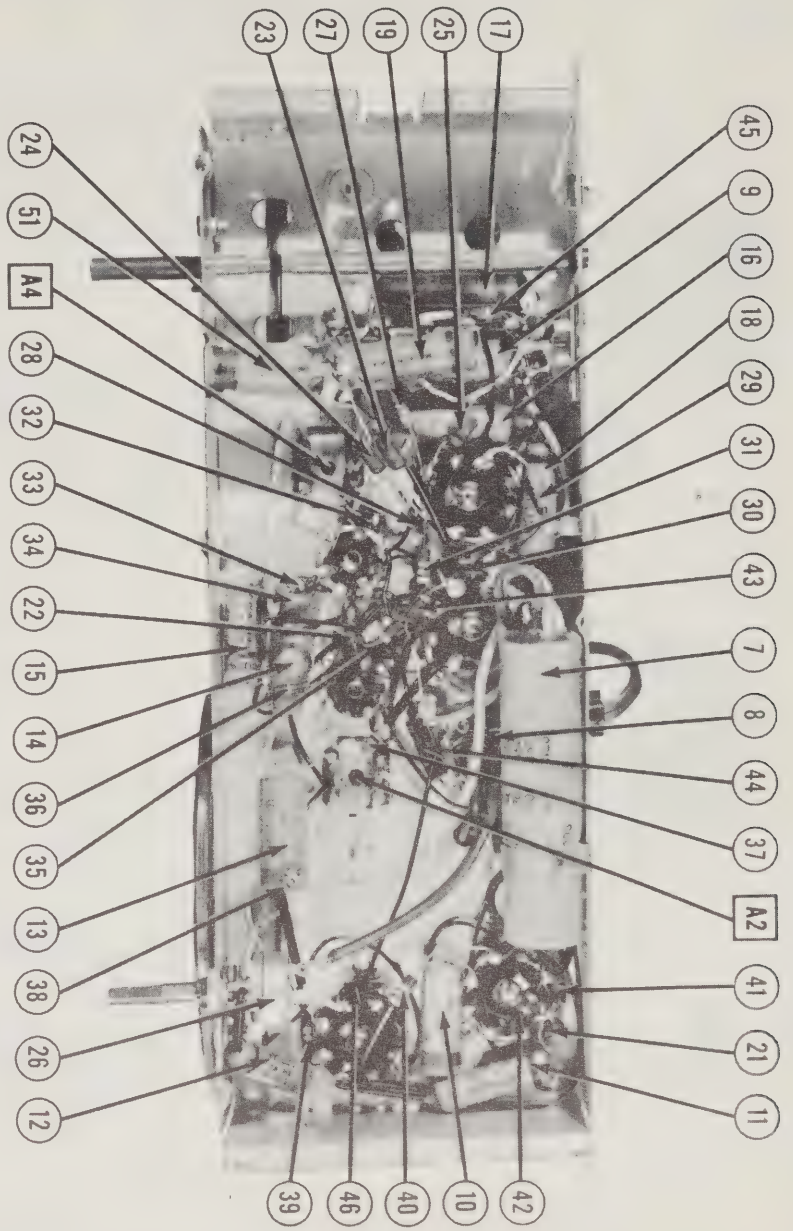
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					PHILCO PART No.		
54	Bayonet	6-8	0.15	Brown	34-2068		Type 47

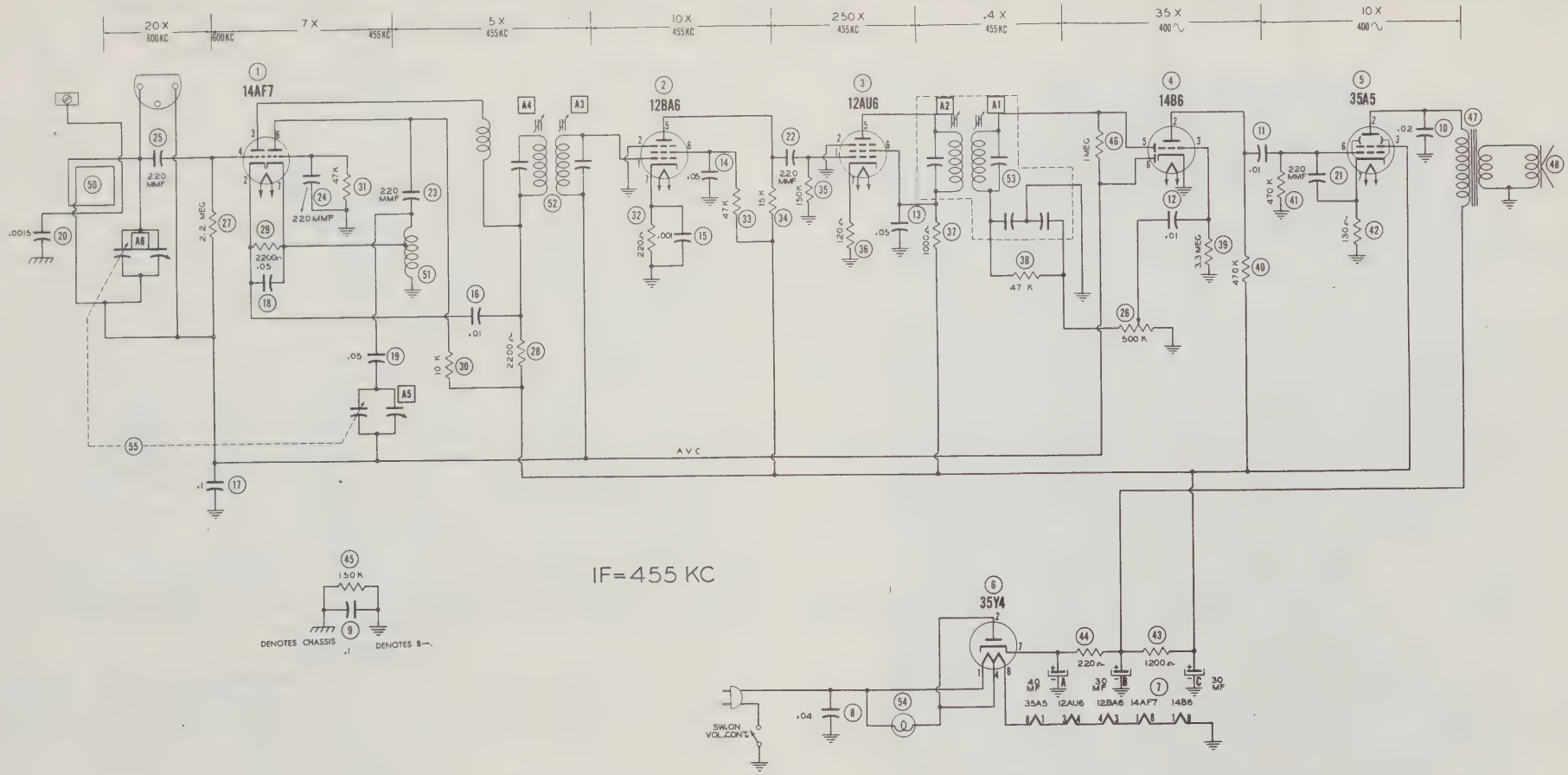
MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
55	2 Gang Var. Cap.	31-2727-1	(19-471MMF, 34-178MMF)
	Cabinet	10693A	
	Dial Scale	54-5018	
	Dial Pointer	54-4617	
	Knob	54-4527-8	2 Required



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14AF7	26VAC	0V.	45VDC	-3.4VDC§	0V.	84VDC	3.7VDC	13VAC
2	12BA6	-.7VDC	0V.	26VAC	39VAC	63VDC	45VDC	.6VDC	-
3	12AU6	-.2VDC	0V.	50VAC	39VAC	83VDC	83VDC	.7VDC	-
4	14B6	13VAC	50VAC	-.6VDC	0V.	-.7VDC	-.7VDC	0V.	0V.
5	35A5	50VAC	97VDC	87VDC	0V.	0V.	0V.	5.8VDC	85VAC
6	35Y4	117VAC	112VAC	87VDC	112VAC	0V.	87VDC	123VDC	85VAC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14AF7	26Ω	2Ω	15KΩ	47KΩ	3.7 Meg.	7KΩ	2.2KΩ	14Ω
2	12BA6	1.5 Meg.	0Ω	26Ω	38Ω	20KΩ	50KΩ	220Ω	-
3	12AU6	150KΩ	0Ω	52Ω	38Ω	6kΩ	6KΩ	120Ω	-
4	14B6	14Ω	470KΩ	3.3 Meg.	0Ω	1.5 Meg.	550KΩ	0Ω	0Ω
5	35A5	52Ω	4KΩ	5KΩ	0Ω	0Ω	470KΩ	130Ω	65Ω
6	35Y4	115Ω	110Ω	5KΩ	110Ω	0Ω	5KΩ	4KΩ	65Ω

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

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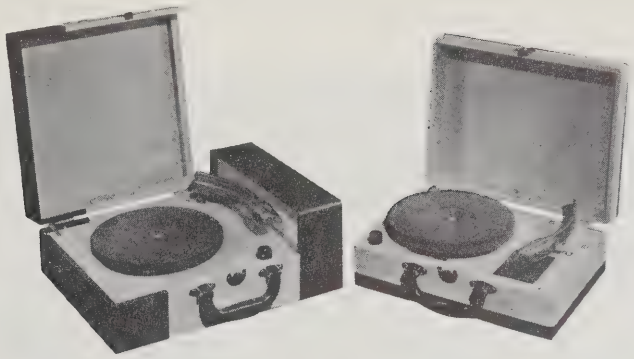
4821-16

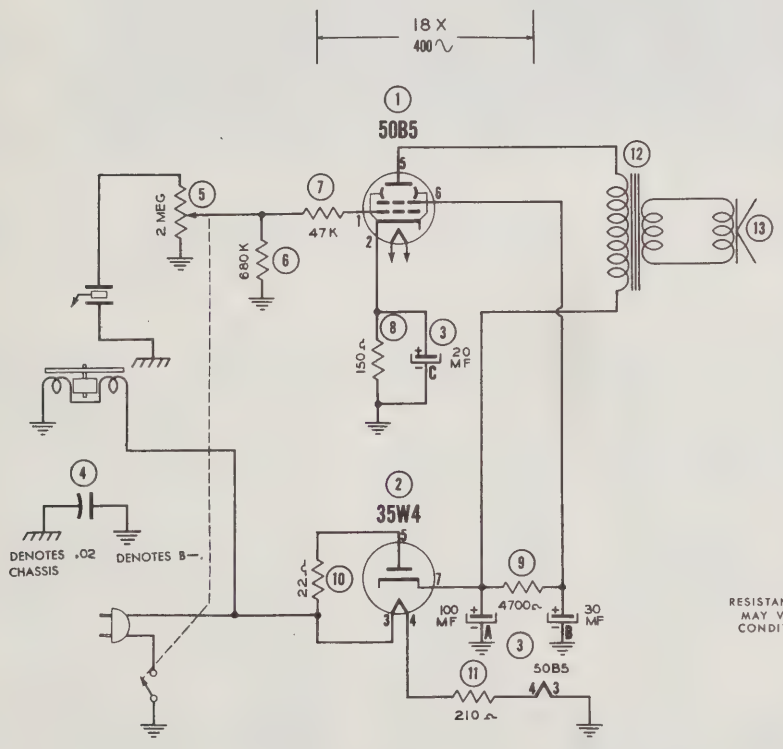
The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



MODEL K-104 MODEL K-92

TRADE NAME	Phonola, Models K-92, K-104
MANUFACTURER	Waters Conley Co., Rochester, Minn.
TYPE SET	AC Operated Phono Player with 2 Tube Amplifier
TUBES (TWO)	Types, 50B5 Power Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC RATING .22 Amp. @ 117 Volts AC



Pin No.	50B5 Volt.	Res.
1	0V.	40KΩ
2	7.4VDC	150Ω
3	0V.	0Ω
4	52VAC	42Ω
5	125VDC	100KΩ
6	115VDC	100KΩ
7	0V.	40KΩ

Pin No.	35W4 Volt.	Res.
1	0V.	INF.
2	0V.	INF.
3	117VAC	34Ω
4	85VAC	56Ω
5	115VAC	56Ω
6	90VAC	52Ω
7	135VDC	100KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4821-17

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at minimum, no signal applied for voltage measurements.

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DATE 12/48-#4821-17 SET #51-FOLDER #17

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHONOLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Power Output-Amp	50B5	50B5	7BZ	
2	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHONOLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
3A	100	150	8396	PRSA-5052*	EZ555150*	D8B-304*	UT-301*	Filter-Blue
B	30	150		PRS150-30		M-30-150		" -Red
C	20	25						Cathode Dypass-Yellow
4	.02	400	8399	484-02	GT4S2	ST-4-02	72P1	Isolation

*Parallel sections to obtain desired capacity.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHONOLA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
5A	2 Meg.	½	8408	D13-139	M-66-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 5A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHONOLA PART No.	IRC PART No.	IDENTIFICATION CODES
6	680KΩ	½	8402	BTS-680K	Blue-Gray-Yl. Output Grid
7	47KΩ	½		BTS-47K	Yl.-Vi.-Or.
8	150Ω	1		BW-1-150	Br.-Grn.-Br. Output Cathode
9	4700Ω	1	8403	BTA-4700	Yl.-Vi.-Red Filter
10	22Ω	½	8432	BW-½-22	Red-Red-Blk. Rectifier Ballast
11	210Ω	5	8401	ABA-250	Red-Br.-Br. Line Dropping-See Note

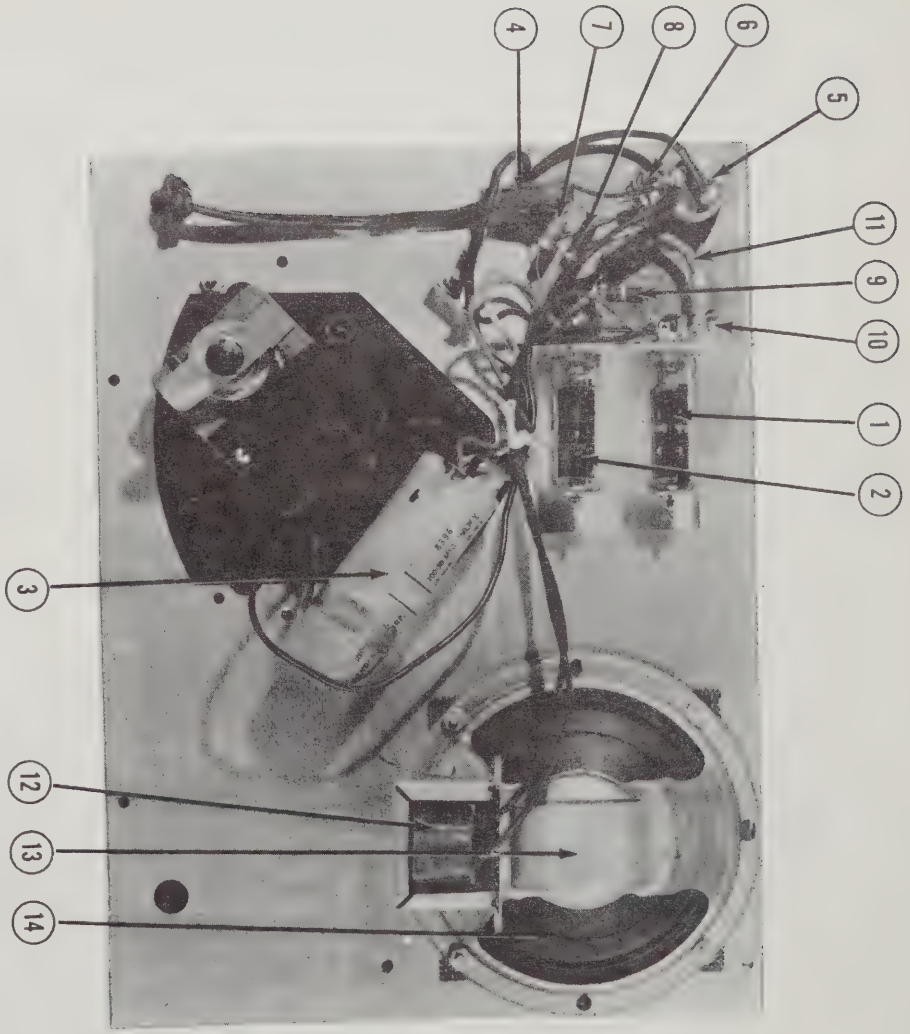
Note-On IRC replacement set slider at 210Ω from one end.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PHONOLA PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	INSTALLATION NOTES
12	2000Ω	3.5Ω	200Ω	.5Ω	Part of 8784	A-3876	T22S45	A-2928	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: PHONOLA PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
13	FIELD	VC IMP.	8784	ST-105	5A15	
	PM	3.5Ω		Mod. P5-X		
14	CONE DIA.	VC DIA.				
	4-3/4"	9/16"				



TRADE NAME RME, Model VHF-152A
MANUFACTURER Radio Mfg. Engineers, Inc., 300-306 1st Ave., Peoria, Illinois
TYPE SET AC Operated Frequency Converter with Output Frequency of 7MC (Nominal)
TUBES (FOUR) Types 6AK5 RF Amp., 6J6 Converter, VR150 Voltage Regulator, 5Y3GT Rectifier

POWER SUPPLY 110-120 Volts AC RATING .38 Amp. @ 117 Volts AC
TUNING RANGE— SHORT WAVE 27.0-29.8MC, 49.5-54.2MC, 143.8-148.2MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01MFD	High side to Pin 5 (grid) of 6J6. Low side to chassis.	6.95MC	27.0-29.8MC	Tuning cap. fully open.	Across voice coil of associated rec.	A1	Adjust for maximum output
2	300Ω carbon resistor	High side to either 2 meter ant. terminal. Low side to other terminal.	148MC	144-148	148MC	Across voice coil of associated rec.	A2	Adjust for maximum output. Tune signal gen. to 161.9MC. If signal is not heard retune signal gen. to 148MC and open A2 to next peak. Adjust for maximum output and recheck for image.
3	300Ω carbon resistor	High side to either 2 meter ant. terminal. Low side to other terminal.	144MC	144-148	144MC	Across voice coil of associated rec.	A3	Adjust for maximum output. Repeat steps 2&3 until no further improvement can be made.
4	300Ω carbon resistor	High side to either 2 meter ant. terminal. Low side to other terminal.	148MC	144-148	Tune for maximum output.	Across voice coil of associated rec.	A4,A5	Rock tuning cap. and adjust A4&A5 for maximum output.
5	300Ω carbon resistor	High side to either 6 meter ant. terminal. Low side to other terminal.	54MC	50-54MC	54MC	Across voice coil of associated rec.	A6	Adjust for maximum output. Tune signal gen. to 67.9MC. If signal is not heard, retuned signal gen. to 54MC and open A6 to next peak. Adjust for maximum output and recheck for image.
6	300Ω carbon resistor	High side to either 6 meter ant. terminal. Low side to other terminal.	50MC	50-54MC	50MC	Across voice coil of associated rec.	A7	Adjust for maximum output. Repeat steps 5 & 6 until no further improvement can be made.
7	300Ω carbon resistor	High side to either 6 meter ant. terminal. Low side to other terminal.	54MC	50-54MC	Tune for maximum output.	Across voice coil of associated rec.	A8,A9	Rock tuning cap. and adjust A8 & A9 for maximum output.
8	300Ω carbon resistor	High side to either 10 meter ant. terminal. Low side to other terminal.	29.7MC	27-29.7MC	29.7MC	Across voice coil of associated rec.	A10	Adjust for maximum output. Tune signal gen. to 43.6MC. If signal is not heard, retune signal gen. to 29.7MC and open A10 to next peak. Adjust for maximum output and recheck for image.
9	300Ω carbon resistor	High side to either 10 meter ant. terminal. Low side to other terminal.	27MC	27-29.7MC	27MC	Across voice coil of associated rec.	A11	Adjust for maximum output. Repeat steps 8 & 9 until no further improvement can be made.
10	300Ω carbon resistor	High side to either 10 meter ant. terminal. Low side to other terminal.	29.7MC	27-29.7MC	Tune for maximum output.	Across voice coil of associated rec.	A12, A13	Rock tuning cap. and adjust A12 & A13 for maximum output.

RME
MODEL VHF-152A

RME
MODEL VHF-152A

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DATE 12/48-#4821-18 SET #51-FOLDER #18

PARTS LIST AND DESCRIPTIONS

RME MODEL VHF-152A

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: RME PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6AK5	6AK5	7BP	
2	Converter	6J6	6J6	7BF	
3	Voltage Reg.	VR150	VR150	4AJ	
4	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RME PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
5A	10	450		AF22J	UP1145	DY-2X10-450	EL-210	■ Filter
B	10	450						▲ Filter
6	.01	600		684-01	DT6S1	ST-6-01	TC-11	Conv. Decoupling
7	25	300						Osc. Feedback - Cer. Note 1
8	1.5	300						Osc. Coupling - Cer.
9	25	300						Osc. Grid Cap. - Cer. Note 1
10	25	300						Fixed Trimmer - Cer. Note 1
11	1000	300		1467-001	1W5D1	MW.5-21	1FM-21	Conv. Cathode Bypass
12	25	300		1469-000025	5R5Q25	MOS.5-425	MS-425	Fixed Trimmer - 10% Cer.
13	100	500		1469-0001	5R5T1	MOS.5-31	MS-31	RF Coupling
14	25	300						Conv. Grid Cap.-Cer. Note 1
15	15	300					MS-415	Fixed Padder- 5% Cer. Note 1
16	1000	500		1467-001	1W5D1	MW.5-21	1FM-21	Filament Bypass
17	1000	500		1467-001	1W5D1	MW.5-21	1FM-21	RF Screen Bypass
18	1000	500		1467-001	1W5D1	MW.5-21	1FM-21	RF Cathode Bypass - Note 2
19	1000	500		1467-001	1W5D1	MW.5-21	1FM-21	RF Cathode Bypass - Note 2
20	15	300					MS-415	Fixed Padder - 5% Cer.
21								Osc. Feedback
22	5	300		1469-000005	5R5V5	MOS.5-55	MS-55	Fixed Padder -Cer.
23	1000	500		1467-001	1D5D1	MW.5-21	1FM-21	Osc. Decoupling

Note 1. Negative temperature coefficient.
Note 2. Some models use only a single 1000 MMFD Cap. as RF Conv. Bypass.

RESISTORS

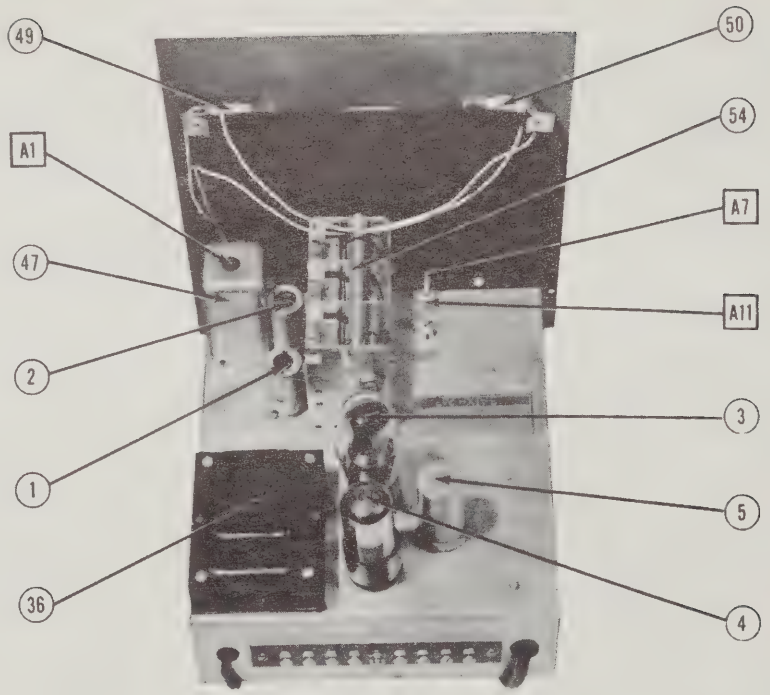
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RME PART No.	IRC PART No.	IDENTIFICATION CODES
24	18Ω	½			Br.-Gray-Blk. Parasitic Suppressor
25	110KΩ	½		BTS-100K	Br.-Br.-Y1. RF Grid
26	220Ω	½			Red-Red-Br. RF Cathode
27	15KΩ	½		BTS-15K	Br.-Grn.-Or. RF Screen
28	18KΩ	2		BT-2-18K	Br.-Gray-Or. RF Plate Load
29	100KΩ	½		BTS-100K	Br.-Blk.-Y1. Converter Grid
30	56Ω	½			Grn.-Blue-Blk. Converter Cathode
31	1000Ω	½		BTS-1000	Br.-Blk.-Red Converter Cathode
32	18Ω	½			Br.-Gray-Br. Parasitic Suppressor
33	4700Ω	½		BTS-4700	Y1.-V1.-Red Oscillator Grid
34	18KΩ	2		BT-2-18K	Br.-Gray-Or. Oscillator Plate
35	3500Ω	10		AB-3500	Voltage Dropping

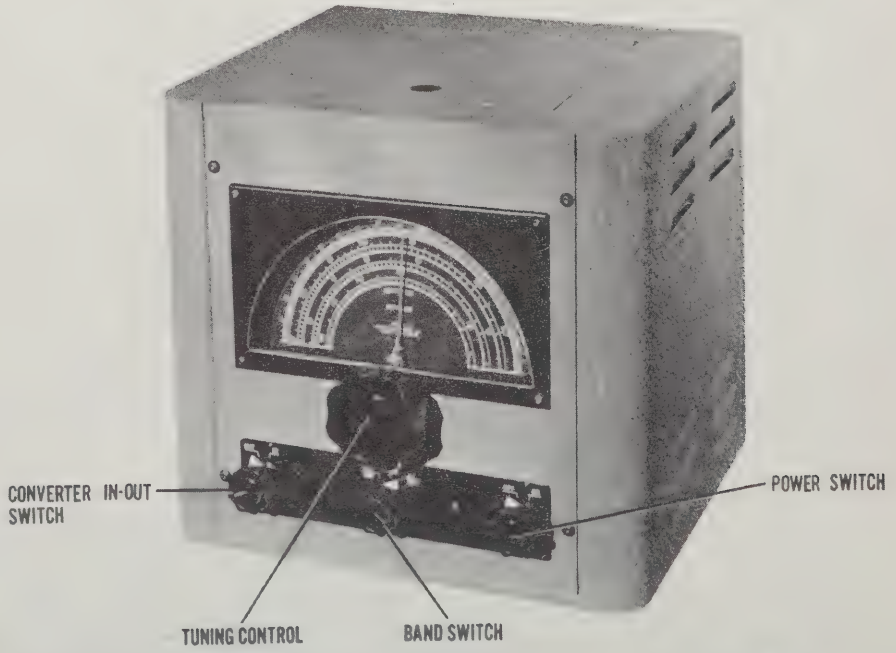
TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: RME PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
36	117VAC @ .38A	620VCT ,05ADC	5.2VAC @ 2.0A	6.6VAC @ 1.0A		P-947 #	T22R04	P-2957 #

Add series resistor to reduce plate voltage.

CHASSIS—TOP VIEW





PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000∿)	RME PART NO.	STANCOR PART NO.	THORDARSON PART NO.	MERIT PART No.	
37	.05A	565Ω	20 Henries		C-1003	T20C53	C-2987	

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	RME PART No.	MEISSNER PART No.	
	Ant. Coils					
38	10 Meter	0Ω	0Ω			
39	6 Meter	0Ω	0Ω			
40	2 Meter	0Ω	0Ω			
	RF Coils					
41	10 Meter		0Ω			
42	6 Meter		0Ω			
43	2 Meter		0Ω			
	Osc. Coils					
44	10 Meter		0Ω			
45	6 Meter		0Ω			
46	2 Meter		0Ω			
47	IF Coil		0Ω			
48	Osc. Plate Choke		0Ω			

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					RME PART No.		
49	Bayonet	6-8V	0.15A	Brown			Type #47
50	Bayonet	6-8V	0.15A	Brown			Type #47

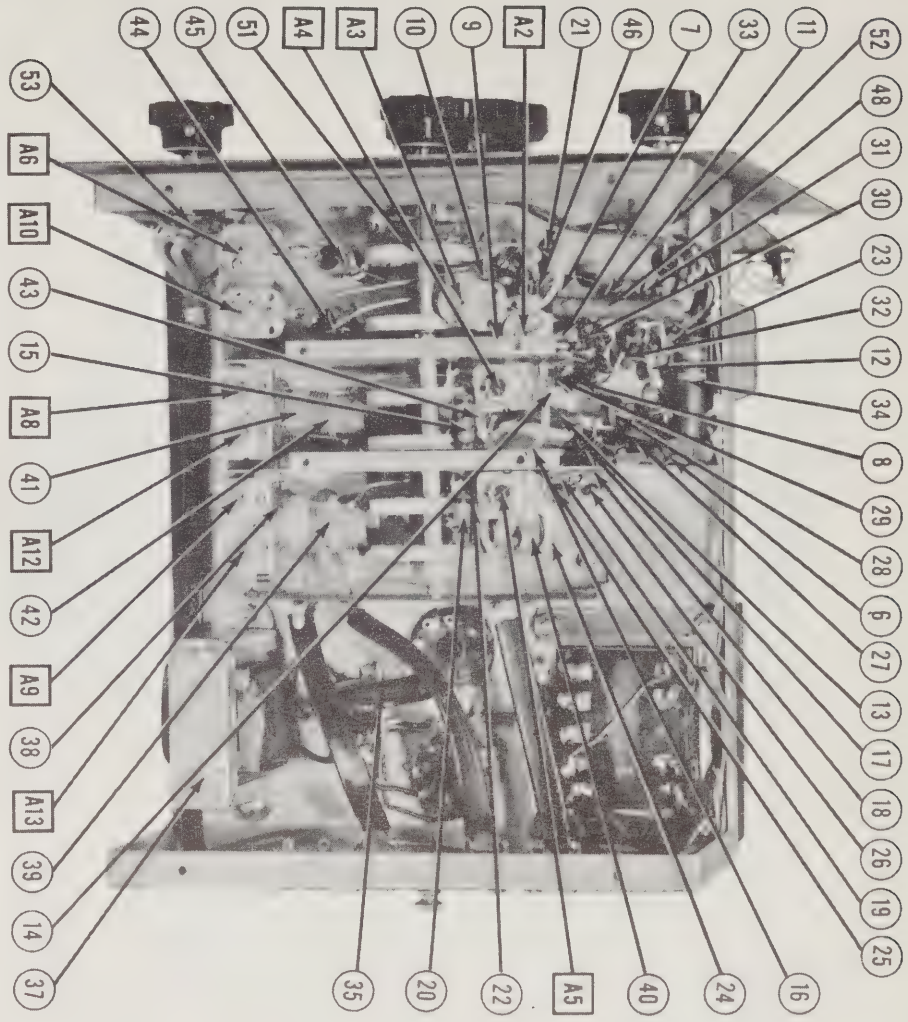
MISCELLANEOUS

ITEM No.	PART NAME	RME PART No.	NOTES
51	Switch		Band
52	Switch		AC on-off
53	Switch		Antenna Change-over
54	3 Gang Var.Cap.		

EXTERNAL CONNECTIONS

The output cable should be connected to the antenna terminal of the receiver. The cable has two shielded leads and a ground lead each ending in a terminal lug. On receivers which have provision for doublet operation, such as the RME-45 and the RME-84, the blue coded lead must be connected to the antenna terminal farthest from the ground terminal. This is the hot side of the converter output. The red lead, or low side, must be connected to the antenna terminal nearest to the ground terminal. The ground braid should be connected to the receiver ground. On receivers not equipped for doublet operation, the blue lead should be connected to the antenna terminal and the red and ground (shield) leads should be connected to the receiver ground. This lead is coded white, Unless the above instructions are followed, the changeover switch will not operate properly.

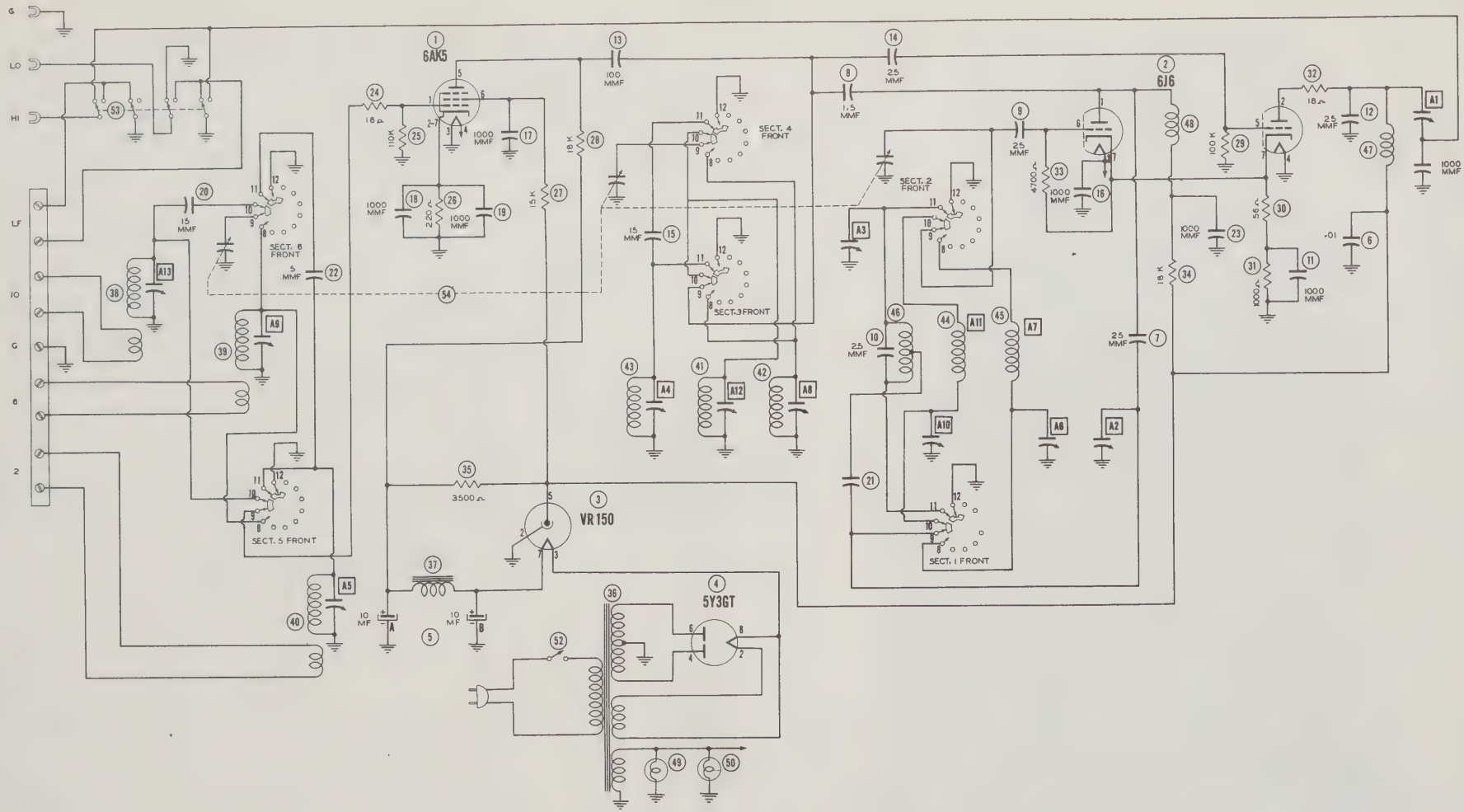
CHASSIS—BOTTOM VIEW



DATE 12/48-#4821-18 SET #51-FOLDER #18

RME MODEL VHF-152A

RME MODEL VHF-152A



VOLTAGE AND RESISTANCE READINGS TAKEN WITH BANDSWITCH ON 10 METER BAND.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6AK5	0V.	2VDC	0V.	6.6VAC	195VDC	115VDC	2VDC	-
2	6J6	65VDC	150VDC	6.6VAC	0V.	0V.	-2.4VDC	6.6VDC	-
3	VR-150	0V.	0V.	325VDC	0V.	150VDC	0V.	325VDC	0V.
4	5Y3GT	0V.	325VDC	0V.	310VAC	0V.	310VAC	0V.	325VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6AK5	110KΩ	220Ω	0Ω	.1Ω	420KΩ	420KΩ	220Ω	-
2	6J6	420KΩ	400KΩ	.1Ω	0Ω	100KΩ	5.7KΩ	1.2KΩ	-
3	VR-150	INF.	0Ω	400KΩ	INF.	400KΩ	INF.	400KΩ	INF.
4	5Y3GT	INF.	400KΩ	INF.	210Ω	INF.	195Ω	INF.	400KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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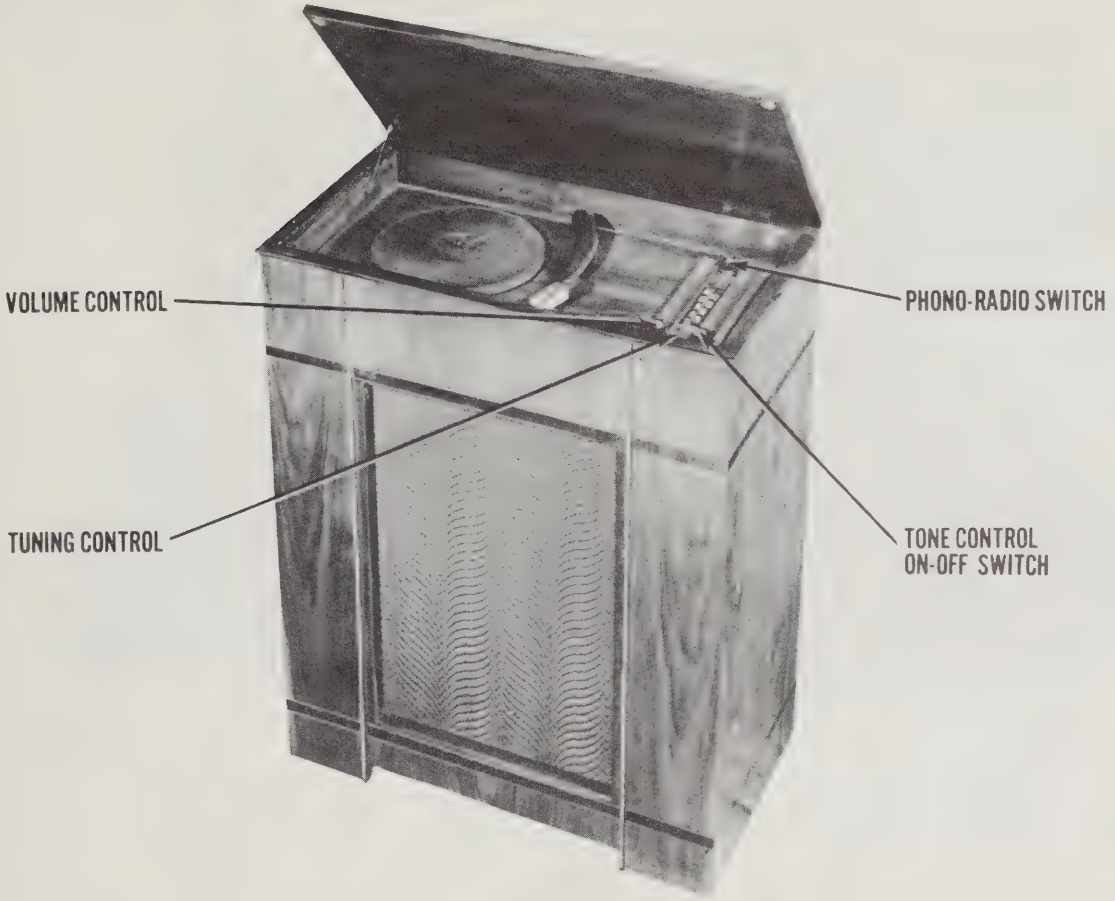
4821-18

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.

SILVERTONE
MODEL 8100 (Ch. 101.829)



SILVERTONE
MODEL 8100 (Ch. 101.829)

SILVERTONE MODEL 8100

TRADE NAME	Silvertone, Model 8100 (Ch. 101.829)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan St., Chicago, Ill.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 14Q7 Converter, 14A7 IF Amp., 7C6 Det.-AVC-AF, 50A5 Power Output, 35Y4 Rectifier.
POWER SUPPLY	110-120 Volts AC-DC
TUNING RANGE—BROADCAST	540-1650KC RATING .25 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1 MFD capacitor in series with low side of signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 6 (grid) of 14Q7. Low side to B-.	455KC	Tuning cap. fully closed	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	.02 MFD.	High side to ext. ant. clip. Low side to B-.	1650KC	Tuning cap. fully open.	"	A5	Adjust for maximum output.
3	.02 MFD.	"	1400KC	Tune for maximum output.	"	A6	" " " "

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DATE 12/48-#4821-19 SET #51-FOLDER #19

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	14Q7	14Q7	8AL	
2	IF Amp.	14A7	14A7	8V	
3	Det.-AVC-AF	7C6	7C6	8W	
4	Power Output	50A5	50A5	6AA	
5	Rectifier	35Y4	35Y4	5AL	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: SOLAR PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	150	R60416	AF88D4	UP4415C	DY-305	EL-352	■ Filter
B	40	150						▲ "
C	20	25						Cathode Bypass
7	.05	600		684-05	DT6S5	ST-6-05	TC-15	Line Filter
8	.1	400		484-.1	DT4P1	ST-4-1	72P2	Line Isolation
9	.02	400		484-02	DT4S2	ST-4-02	TC-12	Output Plate Bypass
10	.005	600		684-005	DT6D5	ST-6-005	TC-25	Audio Coupling
11	.005	600		684-005	DT6D5	ST-6-005	TC-25	" "
12	.1	200		484-.1	DT2P1	ST-2-1	TC-1	AF Plate Decoupling
13	.001	600		684-001	DT6D1	ST-6-001	TC-21	Tone Compensation
14	.02	200		484-02	DT2S2	ST-4-02	TC-12	" "
15	.05	600		684-05	DT6S5	ST-6-05	TC-15	Phono Isolation
16	.05	200		484-05	DT2S5	ST-4-05	TC-15	RF Bypass Pwr. Supply
17	.05	200		484-05	DT2S5	ST-4-05	TC-15	AVC Filter
18	.05	600		684-05	DT6S5	ST-6-05	TC-15	RF Bypass
19	.01	600		684-01	DT6S1	ST-6-01	TC-11	Tuning Cap. Isolation
20	.05	200		484-05	DT2S5	ST-4-05	TC-15	AVC Filter
21	.001	600		684-001	DT6D1	ST-6-001	TC-21	Ext. Ant. Coupling
22	100	500		1468-0001	5W5T1	M0.5-31	1FM-31	AF Plate Bypass
23	50	500		1468-00005	5W5Q5	M0.5-45	1FM-45	Osc. Grid Cap.

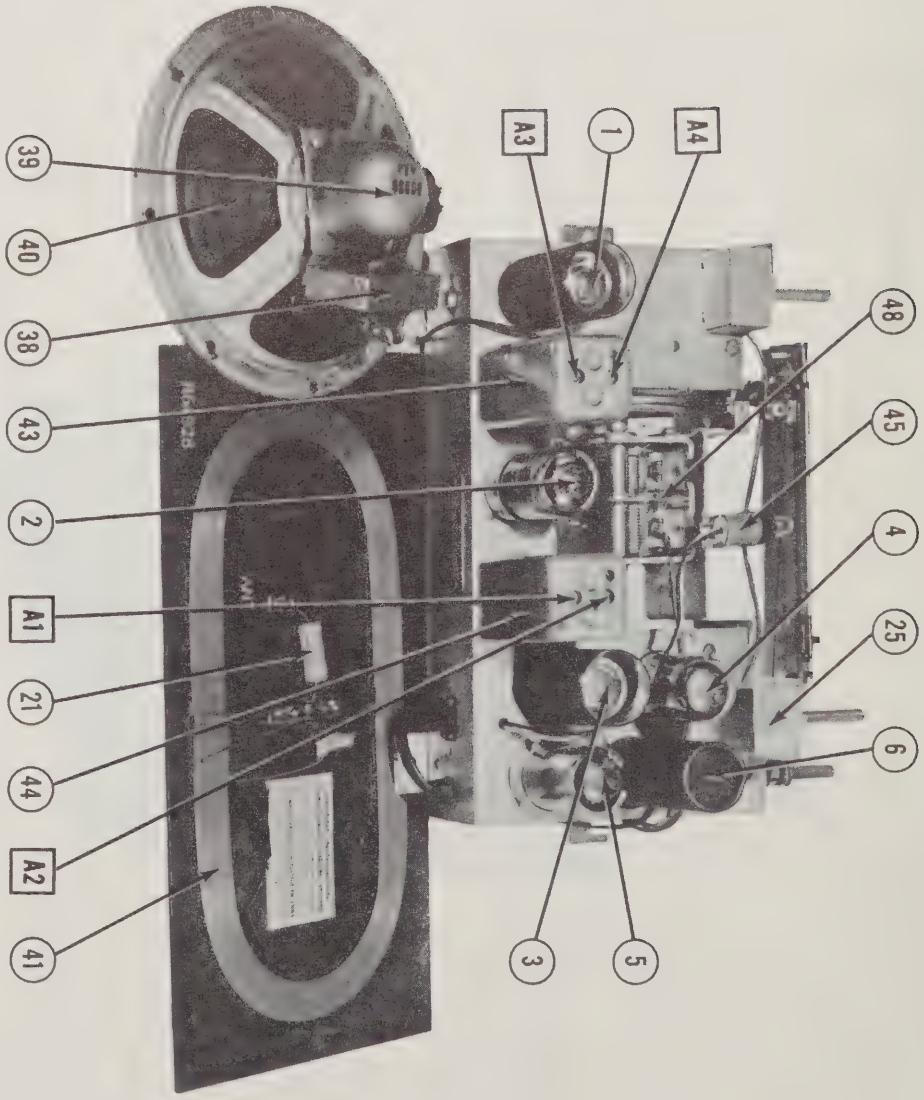
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
24A	500KΩ	½	R62612	D18-133X	T-88	Volume Control tapped @ 50KΩ
B	Shaft		Not Req.	A	Not Req.	Attach to 24A per instructions
25A	2 Meg.	½	R62529	D13-139	M-66-Z	Tone Control
B	Shaft		Not Req.	A	Not Req.	Attach to 25A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
26	22KΩ	½		BTS-22K	Red-Red-Or. AVC Network
27	100Ω	½		BW-½-100	Br.-Blk.-Br. Conv. Bias
28	22KΩ	½		BTS-22K	Red-Red-Or. Osc. Grid
29	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AVC Network
30	22KΩ	½		BTS-22K	Red-Red-Or. Tone Compensation
31	4.7 Meg.	½		BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Grid
32	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. AF Plate Load
33	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AF Plate Decoupling
34	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. Output Grid
35	150Ω	½		BW-½-150	Br.-Grn.-Br. Output Cathode
36	1200Ω	1		BTA-1200	Br.-Red-Red Filter
37	25Ω	1	R40232	BW-1-27	Red-Grn.-Blk. Surge Limiter

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SILVERTONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
38	2300Ω	3.4Ω	407Ω tapped @ 21Ω	1.0Ω	R62602	A-3330†		A-3031†	†Bend mounting tabs down, file out slots and mount on original bracket.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			SILVERTONE PART No.	JENSEN PART No.	QUAM PART No.	
39	FIELD PM	VC IMP. 3.4Ω	R62636	ST-108 Mod. P6-X	6A21	
40	CONE DIA. 6-1/8"	VC DIA. 9/16"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	SILVERTONE PART No.	MEISSNER PART No.	
41	Loop Ant.	.1Ω	2Ω	R64928		
42	Osc. Coil		6Ω	R61107	14-1060	
43	Input IF	23.1Ω	23.4Ω	R62513	16-6658	
44	Output IF	14Ω		R60418		

DIAL LIGHT

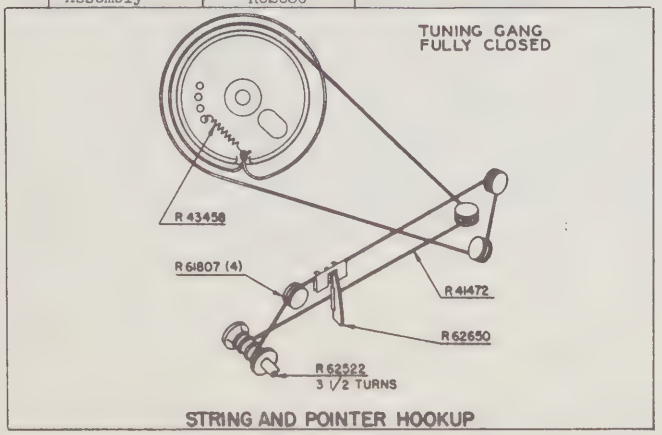
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					SILVERTONE PART No.		
45	Bayonet	6-8	0.15	Brown			Type 47

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA		REMARKS
	SILVERTONE PART No.	ASTATIC PART No.	
46		L-70-A	L-70 Original Part

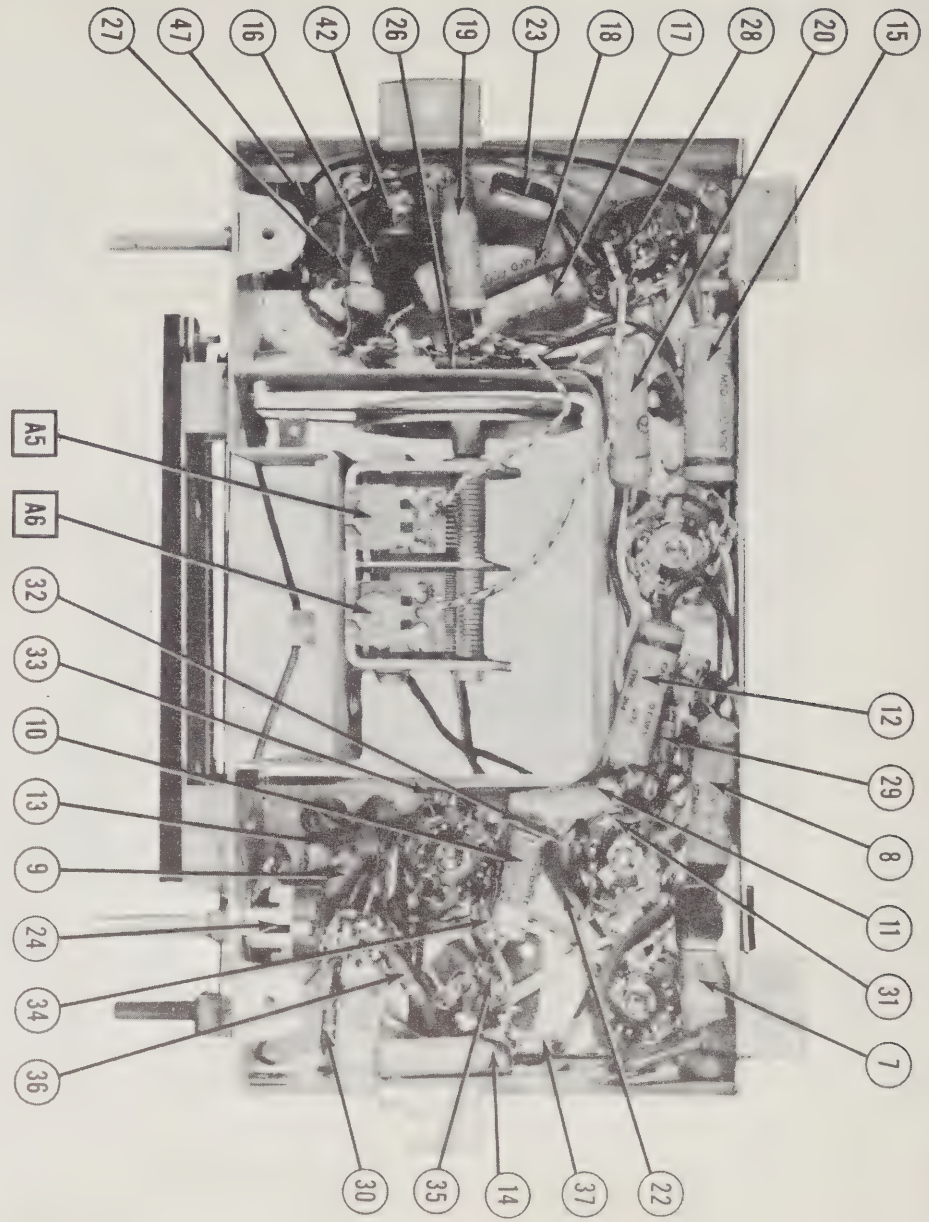
MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
47	Switch	R62657	Radio-Phono
48	2 Gang Var. Cap.	R61100	(38-493MMF, 30-195MMF)
	Dial Pointer Assembly	R62650	



STRING AND POINTER HOOKUP

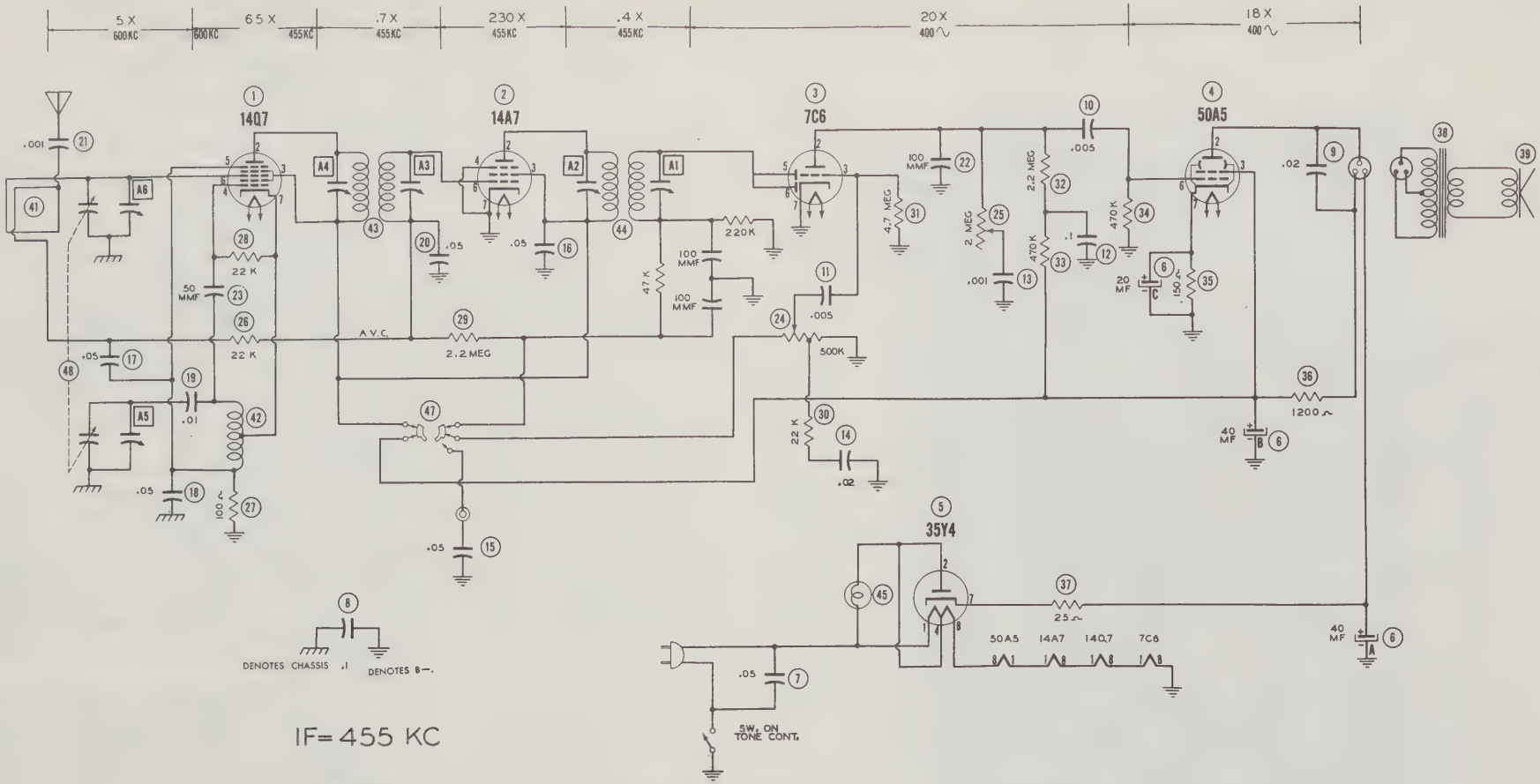
CHASSIS—BOTTOM VIEW



DATE 12/48-#4821-19 SET #51-FOLDER #19

SILVERTONE MODEL 8100

SILVERTONE MODEL 8100



IF= 455 KC

VOLTAGE READINGS

RADIO-PHONO SWITCH IN RADIO POSITION.

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14Q7	17.5VAC	80VDC	80VDC	-6.8VDC§	.6VDC	-.2VDC	.8VDC	6.8VAC
2	14A7	33VAC	80VDC	80VDC	0V.	0V.	-.2VDC	0V.	17.5VAC
3	7C6	6.8VAC	35VDC	-.8VDC	0V.	-.2VDC	-.2VDC	0V.	0V.
4	50A5	33VAC	100VDC	80VDC	65VDC	0V.	0V.	3.4VDC	83VAC
5	35Y4	117VAC	112VAC	0V.	112VAC	0V.	0V.	115VDC	85VAC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	14Q7	23Ω	50KΩ	50KΩ	22KΩ	100Ω	2.4 Meg.	100Ω	8Ω
2	14A7	38Ω	50KΩ	50KΩ	0Ω	0Ω	2.4 Meg.	0Ω	23Ω
3	7C6	8Ω	2.7 Meg.	4.7 Meg.	0Ω	170KΩ	170KΩ	0Ω	0Ω
4	50A5	38Ω	50KΩ	50KΩ	700KΩ	170KΩ	470KΩ	150Ω	65Ω
5	35Y4	115Ω	110Ω	INF.	110Ω	0Ω	INF.	50KΩ	85Ω

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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4821-19

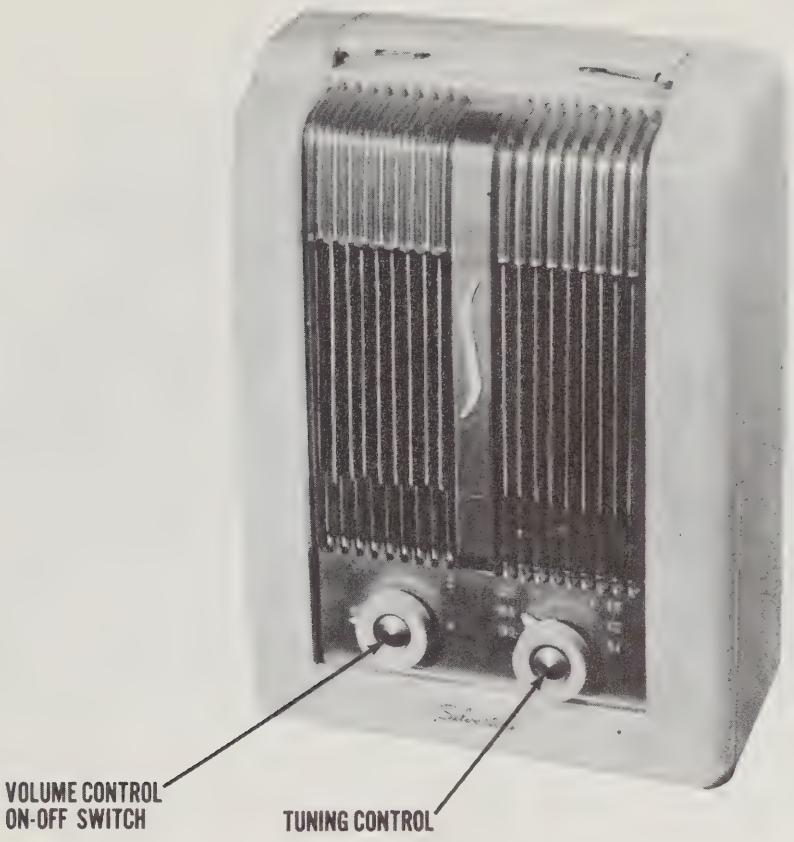
The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder
*TRADE MARK

SILVERTONE
MODEL 9260 (Ch. 101.850)
BATTERY OPERATED

SILVERTONE
MODEL 9260 (Ch. 101.850)
BATTERY OPERATED



SILVERTONE
MODEL 9260 (Ch. 101.850)
BATTERY OPERATED

SILVERTONE MODEL 9260

TRADE NAME	Silvertone, Model 9260 (Ch. 101.850)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan St., Chicago, Ill.
TYPE SET	Three Power Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 1R5 Converter, 1L4 IF Amp., 1U5 Det.-AVC-AF, 1LB4 Power Output, 117Z3 Rectifier.
POWER SUPPLY RATING	110-120 Volts AC-DC or 6 Volts "A" Supply and 67.5 Volts "B" Supply in Pack Form .14 Amp. @ 117 Volts AC or 60MA @ 6 Volts DC and 10MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540-1640KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1 MFD capacitor in series with low side of the signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 6 (grid) of 1R5. Low side to B-.	455KC	Tuning cap. fully closed	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy ant. to 200 MMF to reduce hum modulation. (Install receiver in cabinet with loop connected and batteries in place).
2		Loop	1400KC	Tuning cap. fully open.	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	"	Tune for maximum output.	"	A6	Adjust for maximum output.

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DATE 12/48-#4821-20 SET #51-FOLDER #20

PARTS LIST AND DESCRIPTIONS

SILVERTONE MODEL 9260

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1L4	1L4	6AR	
3	Det.-AVC-AF	1U5	1U5	6BW	
4	Power Output	1LB4	1LB4	5AD	
5	Rectifier	117Z3	117Z3	4BR	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	40	150	R65308	PRSA503010	EDL4415	DSB-2x40-150	TA-311	Filter-Red
B	40	150			BRH251	M-100-25		" -Blue
C	120	25						Fil. Byp.-Green
7	.05	400		484-05	GT4S5	ST-4-05	TC-15	Line Filter
8	.05	200	R20720	484-05	GT2S5	ST-4-05	TC-15	Line Isolation
9	.005	400		484-005	GT6D5	ST-6-005	TC-25	Audio Coupling
10	.001	400		484-001	GT6D1	ST-6-001	TC-21	" "
11	.01	400		484-01	GT4S1	ST-4-01	TC-11	AF Screen Bypass
12	.001	400		484-001	GT6D1	ST-6-001	TC-21	RF Bypass
13	.05	100	R44623	484-05	GT2S5	ST-4-05	TC-15	Fil. Bypass
14	.01	400		484-01	GT4S1	ST-4-01	TC-11	Screen Decoupling
15	.05	100	R44623	484-05	GT2S5	ST-4-05	TC-15	AVC Filter
16	100	500	R65333	1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass-Cer.
17	50	500	R65332	1468-00005	5W5Q5	MO.5-45	1FM-45	Diode RF Filter "
18	200	300	*	1468-0002	5W5T2	MO.5-32	1FM-32	IF Grid Filter "
19	50	500	R65332	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap. "

*Items #18 and 39 are combined into one part obtainable under manufacturers Part #R65326.

CONTROLS

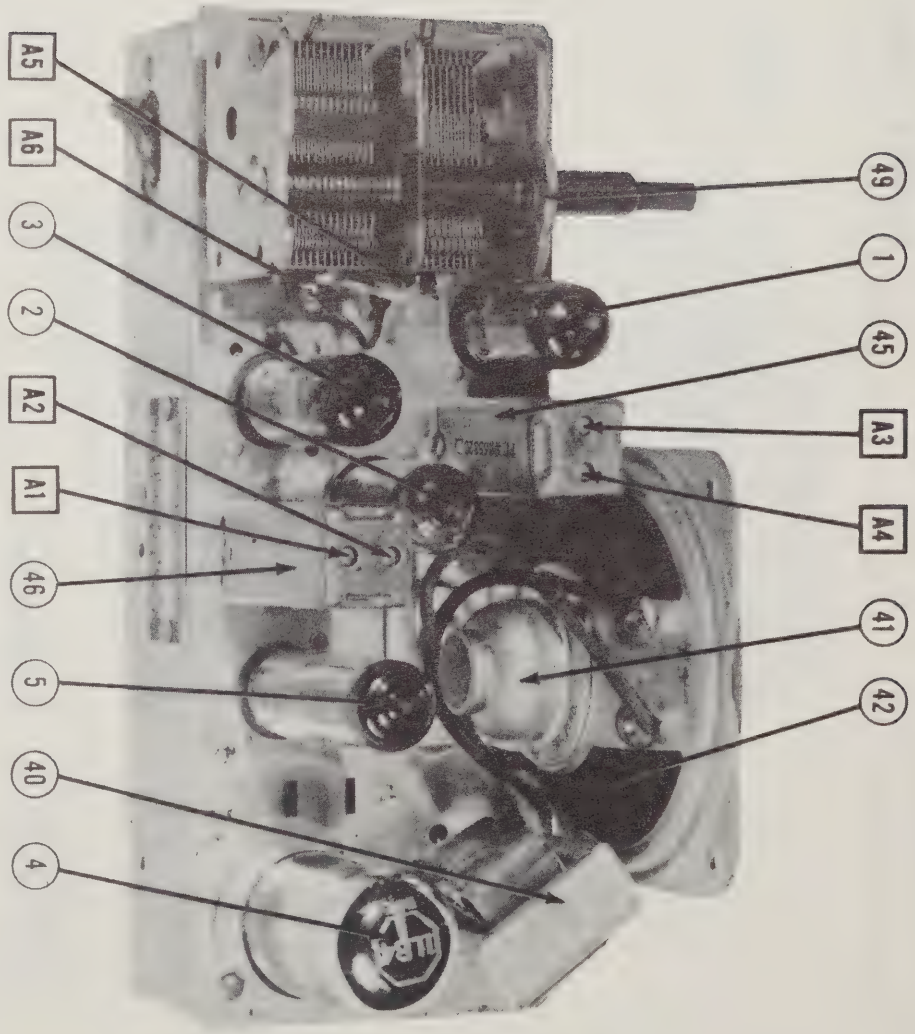
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
20A	1 Meg.	½	R65309	D13-137	M-63-Z	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 20A per instructions
C	Switch		" "	42	SW-A2	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	IDENTIFICATION CODES
21	82KΩ	½		BTS-82K	Gray-Red-Or. Oscillator Grid
22	3.3 Meg.	½		BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
23	8200Ω	½		BTS-8200	Gray-Red-Red Screen Dropping
24	1.8 Meg.	½		BTS-1.8 Meg.	Br.-Gray-Grn. Bias Network
25	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
26	4.7 Meg.	½		BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Screen Dropping
27	680KΩ	½		BTS-680K	Blue-Gray-Yl. AF Plate Load
28	1 Meg.	½		BTS-1 Meg.	Br.-Blk.-Grn. Tone Compensation
29	4.7 Meg.	½		BTS-4.7 Meg.	Yl.-Vi.-Grn. Output Grid
30	270KΩ	½		BTS-270K	Red-Vi.-Yl. Bias Network-See Note 1
31	1500Ω	1		BTA-1500	Br.-Grn.-Red Filter
32	2200Ω	1		BTA-2200	Red-Red-Red Bleeder
33	1800Ω	5	R60810	ABA-2000	Br.-Gray-Red Filament Dropping-See Note 2
34	1200Ω	½		BTS-1200	Br.-Red-Red Filament String
35	560Ω	½		BTS-560	Grn.-Blue-Br. Filament String
36	560Ω	½		BTS-560	Grn.-Blue-Br. " "
37	470Ω	½		BTS-470	Yl.-Vi.-Br. " "
38	100Ω	2	R61219	BW-2-100	Br.-Blk.-Br. Surge Limiter
39	4.7 Meg.	½	*	BTS-4.7 Meg.	IF Grid

Note 1-Some models may use 470KΩ in this application. IRC replacement BTS-470KΩ.
Note 2-On IRC replacement set slider at 1800Ω from one end.
* - Items 39 & 18 are combined into one part obtainable under Part #R65326.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SILVERTONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
40	15KΩ	3.6Ω	845Ω	.5Ω	R65312	A-3881#		A-2999#	#Solder to chassis.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			SILVERTONE PART No.	JENSEN PART No.	QUAM PART No.	
41A B	FIELD PM	VC IMP. 3.6Ω	R66447 R65311		3A07†	†Fabricate new mounting bracket.
42	CONE DIA. 3-3/8"	VC DIA. 9/16"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	SILVERTONE PART No.	MEISSNER PART No.
43	Loop Ant.		2.5Ω	R65327	
44	Osc. Coil	2.8Ω	10Ω	R65322	
45	Input IF	24Ω	24Ω	R65320	16-6668
46	Output IF	15Ω	15Ω	R65321	16-6669

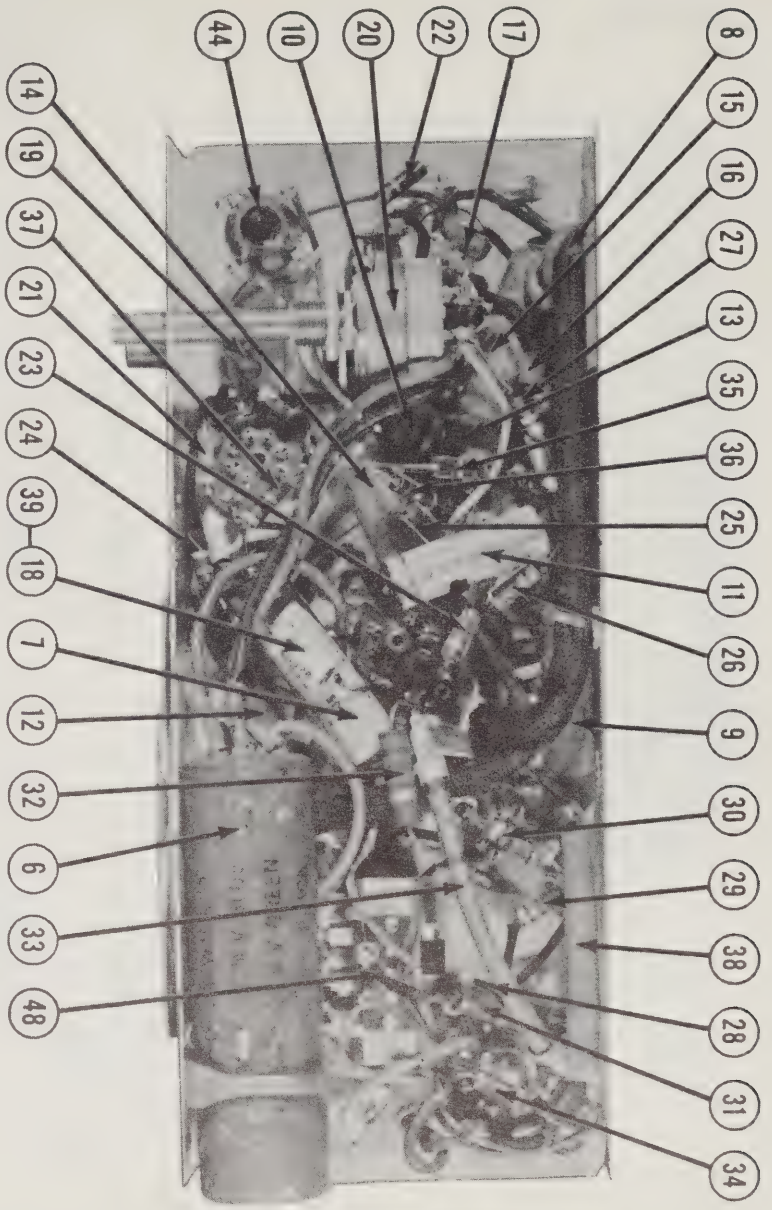
BATTERIES

ITEM No.	VOLTAGE	SILVERTONE PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
47	6V "A" 67.5V "B"	6406							

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
48	Switch	R65313	AC/DC-Batt.
49	2 Gang Var. Cap	R65307	(28-425MMF, 25-169MMF)
	Cabinet	R65301	
	Dial Pointer	R65325	

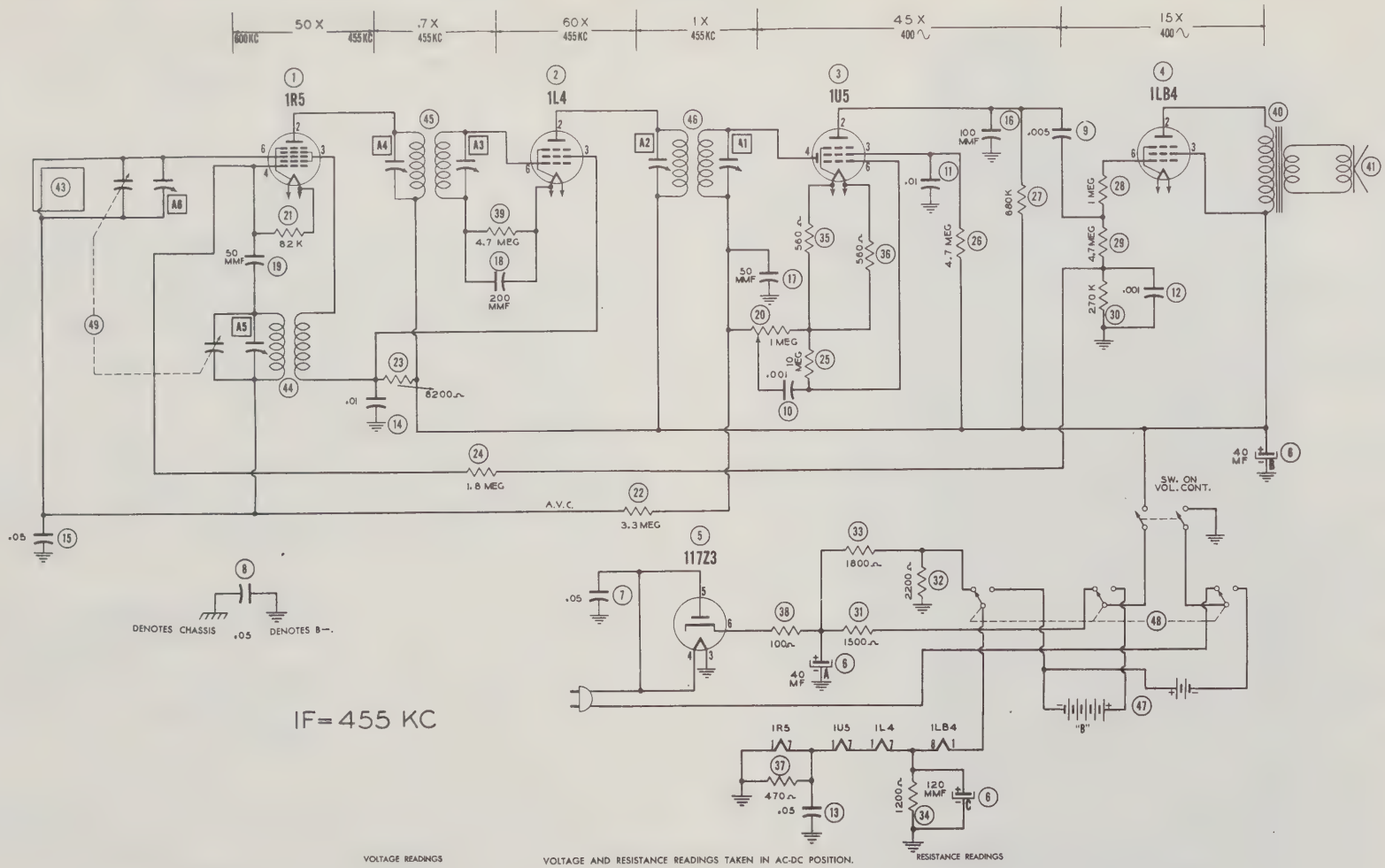
CHASSIS—BOTTOM VIEW



DATE 12/48-#4821-20 SET #51-FOLDER #20

SILVERTONE MODEL 9260

SILVERTONE MODEL 9260



IF = 455 KC

VOLTAGE READINGS

VOLTAGE AND RESISTANCE READINGS TAKEN IN AC-DC POSITION.

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	1R5	0V.	76VDC	55VDC	-9VDC§	0V.	0V.	1.4VDC	-
2	1L4	2.8VDC	76VDC	55VDC	5.7VDC	2.8VDC	.1VDC	4.4VDC	-
3	1U5	1.4VDC	25VDC	15VDC	.3VDC	76VDC	0V.	2.8VDC	-
4	1LB4	5.7VDC	74VDC	76VDC	0V.	0V.	0V.	95VDC	4.4VDC
5	117Z3	117VAC	0V.	0V.	117VAC	117VAC	103VDC	-.6VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	1R5	0Ω	2KΩ	10KΩ	82KΩ	0Ω	5 Meg.	*	-
2	1L4	*	2KΩ	10KΩ	*	*	4.7 Meg.	*	-
3	1U5	*	680KΩ	4.7 Meg.	1.3 Meg.	2KΩ	10 Meg.	*	-
4	1LB4	*	3KΩ	2KΩ	0Ω	5 Meg.	6 Meg.	1.8KΩ	*
5	117Z3	450Ω	0Ω	0Ω	450Ω	450Ω	2KΩ	250KΩ	-

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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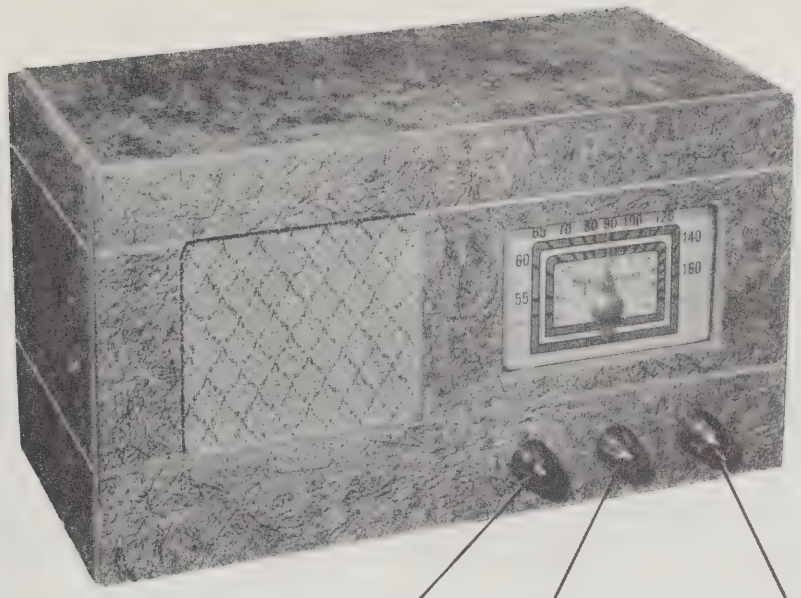
4821-20

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC to B-.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volts.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.

SPARTON MODEL
6-66A (Ch. 666A)



SPARTON MODEL
6-66A (Ch. 666A)

SPARTON MODEL 6-66A

TRADE NAME	Sparton, Model 6-66A (Ch. 666A)		
MANUFACTURER	Sparks-Withington Co., Jackson, Mich.		
TYPE SET	AC-DC Operated 2 Band Superheterodyne Receiver with Loop Antenna		
TUBES (SIX)	Types, 12SK7 RF Amp., 12SA7GT Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 35L6GT Power Output, 35Z5GT Rectifier.		
POWER SUPPLY	110-120 Volts AC-DC	RATING	.25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	530-1700KC	**SHORT WAVE**	5.2 - 19.5MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low freq. end of dial.

Dummy antenna consists of a 200MMFD cap. in series with a 20 microhenry choke, the choke being shunted by a 400MMFD cap. in series with a 100Ω carbon resistor.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.02 MFD	High side to Pin 8 (grid) of 12SA7. Low side to B-.	456KC	BC (Counter-clock-wise)	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. If isolation transformer is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
2	See pre-align-ment notes	High side to ant lead. Low side to B-.	"	"	Tuning Cap. fully closed	"	A5	Adjust for minimum output
3	"	"	1500KC	"	1500KC	"	A6	Adjust for maximum output
4	"	"	"	"	Tune for max-imum output.	"	A7	" " " "
5	"	"	600KC	"	"	"	A8	Rock tuning cap. and adjust for maximum output. Repeat Steps 3, 4 & 5 until no further improvement can be made. Check calibration at 600KC, 1000KC and 1500KC.
6	"	"	18MC	SW (Clock-wise)	18MC	"	A9	Adjust for maximum output
7	"	"	"	"	Tune for max-imum output.	"	A10	Rock tuning cap. and adjust for maximum output. Check calibration at 18MC, 9MC and 6MC.

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PARTS LIST AND DESCRIPTIONS

SPARTON MODEL 6-66A

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SPARTON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	12SK7	12SK7	8N	
2	Converter	12SA7GT	12SA7GT	8AD	
3	IF Amp.	12SK7	12SK7	8N	
4	Det.-AVC-AF	12SQ7	12SQ7	8Q	
5	Power Output	35L6GT	35L6GT	7AC	
6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SPARTON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	40	150	PA4304-1	AF88D	UP4315	DY-4030-150	EL-35	■ Filter
B	30	150						▲ "
8	.05	400	PC40HL-503	484-05	DT4S5	ST-4-05	TC-15	Rectifier Bypass
9	.15	400	PC40GL-154	484-.15	DT4P1	ST-4-1	72P2	Line Isolation
10	.05	400	PC40HL-503	484-05	DT4S5	ST-4-05	72P1	" "
11	.03	400	PC40GL-303	484-03	DT4S3	ST-4-03	TC-13	Output Plate Bypass
12	.01	400		484-01	DT4S1	ST-4-01	TC-11	Audio Coupling
13	.01	400		484-01	DT4S1	ST-4-01	TC-11	■ ■
14	.1	200	PC40HK-104	484-.1	DT2P1	ST-2-1	TC-1	RF Bypass Pwr. Supply
15	.05	200	PC40HK-503	484-05	DT2S5	ST-4-05	TC-15	AVC Filter
16	.05	200	PC40HK-503	484-05	DT2S5	ST-4-05	TC-15	" "
17	.01	200	PC40HK-103	484-01	DT2S1	ST-4-01	TC-11	RF Cathode Bypass
18	.001	600		684-001	DT6D1	ST-6-001	TC-21	Ant. Coupling
19	510	500	MC-60G-511	1468-0005	5W5T5	MO.5-35	1FM-35	Diode RF Filter
20	100	500	MC-60F-101	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling
21	51	500	MC-60F-510	1468-00005	5W5Q5	MO.5-45	1FM-45	Osc. Grid Cap.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SPARTON PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
22A	500KΩ	½	PA-4400-4	D13-133	AM-60-Z	Volume Control
B	Shaft		Not Req.	E	KS8-3	Attach to 22A per instructions
C	Switch		" "	41	SW-A	" " " " "

RESISTORS

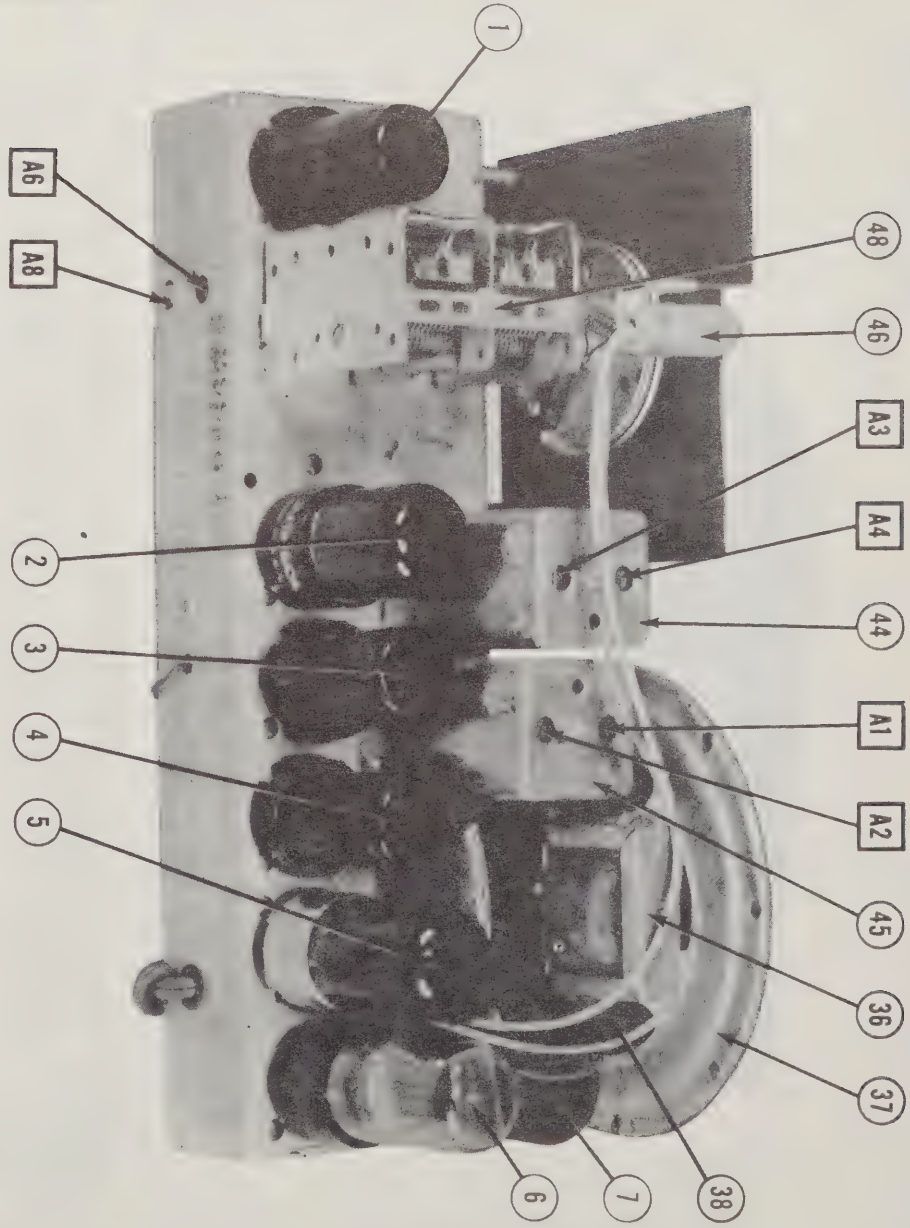
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SPARTON PART No.	IRC PART No.	IDENTIFICATION CODES
23	470Ω	½	BR12G-471	BTS-470	Yl.-Vi.-Br. RF Cathode
24	2700Ω	½	BR12S-272	BTS-2700	Red-Vi.-Red RF Plate Load
25	10 Meg.	½	BR12S-106	BTS-10 Meg.	Br.-Blk.-Blue Osc. Grid
26	22KΩ	½	BR12S-223	BTS-22K	Red-Red-Or. Osc. Grid
27	5100Ω	½	BR12G-512	BTS-5100	Grn.-Br.-Red Conv. Grid
28	1 Meg.	½	BR12S-105	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
29	56KΩ	½	BR12G-563	BTS-56K	Grn.-Blue-Or. Diode Filter
30	10 Meg.	½	BR12S-106	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
31	270KΩ	½	BR12S-274	BTS-270K	Red-Vi.-Yl. AF Plate Load
32	680KΩ	½	BR12S-684	BTS-680K	Blue-Gray-Yl. Output Grid
33	180Ω	½	BR12S-181	BW-½-180	Br.-Gray-Br. Output Cathode
34	1200Ω	1	CR12S-122	BTA-1200	Br.-Red-Red Filter
35	82Ω	½	BR12S-820	BW-½-82	Gray-Red-Blk. Rectifier Ballast
49	100KΩ	½		BTS-100K	Br.-Blk.-Yl. 1st IF Pri.-Shunt-See Note

Note-Not used in all models.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: SPARTON PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.	INSTALLATION NOTES
36	2300Ω	4.0Ω	275Ω	1Ω	Part of PC63000-13	A-3876‡	T22S45‡	A-2928‡	‡Bend mounting tabs down, file out slots and mount on original brackets.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: SPARTON PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-105		
37	PM	4.0Ω	PC63000-13	Mod. P5-X	5A15	
	CONE DIA.	VC DIA.				
38	4-13/16"	9/16"				

R F COILS

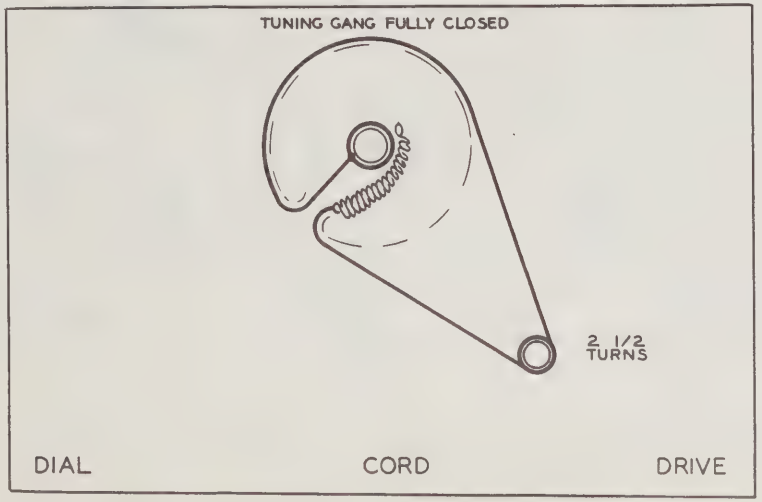
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: SPARTON PART No.	MEISSNER PART No.
39	Wave Trap Coil		30.5Ω	AA6765-1	
40	BC Ant.Coil	39Ω	5.5Ω	AA6764-2	
41	SW " "	.5Ω	0Ω	AA6725-3	
42	BC Osc.Coil	.4Ω	4Ω	AA6766-3	
43	SW " "	0Ω	.2Ω	AA6753-6	
44	Input IF	9Ω	9Ω	AA6800-1	
45	Output IF	11Ω	5Ω	AA6800-4	

DIAL LIGHT

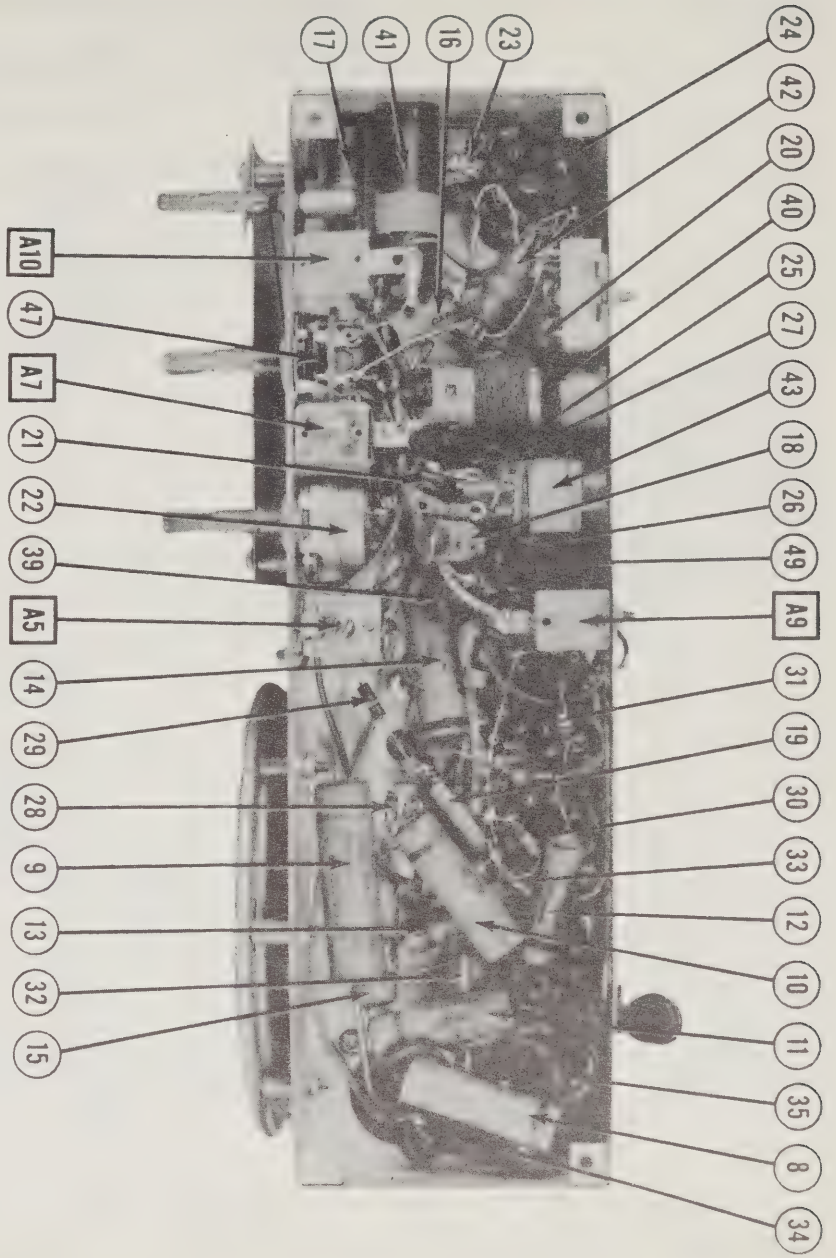
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: SPARTON PART No.		INSTALLATION NOTES
46	Bayonet	7.5	0.2	White	PA4101		Type #51

MISCELLANEOUS

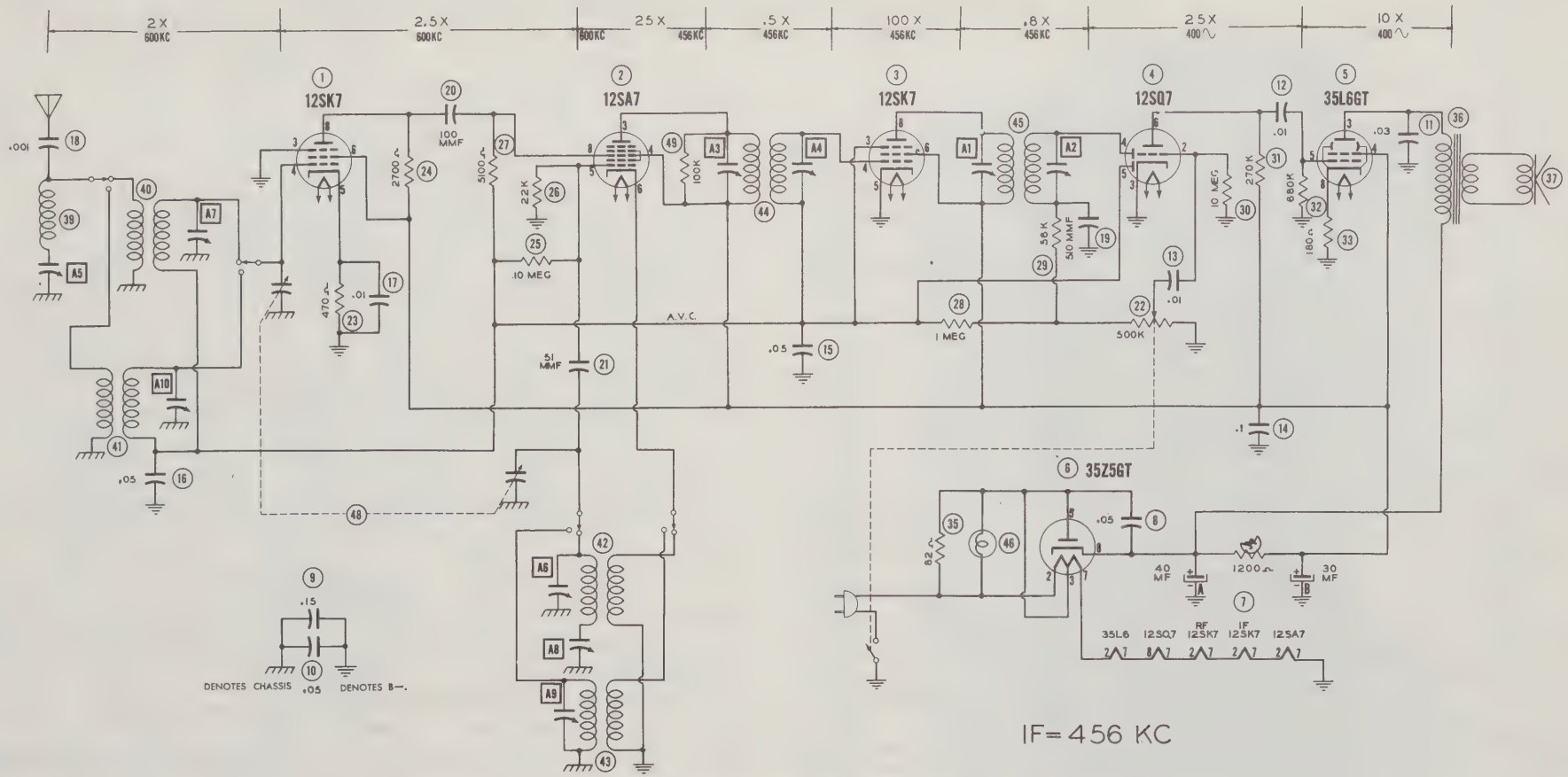
ITEM No.	PART NAME	SPARTON PART No.	NOTES
47	Switch	PA4602-2	Band
48	2 Gang Var. Cap.	PB40410	(12-412 MMF) each section
A5	Trimmer	PA4352-4	IF Reject
A6, A8	Trimmer Strip	PA4359	BC Osc. Adj. (Padder)
A7	Trimmer	PA4352-2	BC Ant. Adj.
A9	"	PA4352-1	SW Osc. Adj.
A10	"	PA4352-2	SW Ant. Adj.



CHASSIS—BOTTOM VIEW



SPARTON MODEL 6-66A



IF = 456 KC

VOLTAGE READINGS

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SK7	0V.	36VAC	0V.	-.6VDC	3VDC	85VDC	24VAC	70VDC
2	12SA7GT	0V.	12VAC	85VDC	85VDC	-4.5VDC§	0V.	0V.	-.6VDC
3	12SK7GT	0V.	24VAC	-.6VDC	-.6VDC	0V.	85VDC	12VAC	85VDC
4	12SQ7	0V.	-.5VDC	0V.	0V.	-.6VDC	55VDC	39VAC	50VAC
5	35L6GT	0V.	90VAC	110VDC	85VDC	0V.	0V.	50VAC	6VDC
6	35Z5GT	0V.	117VAC	113VAC	0V.	113VAC	0V.	90VAC	120VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SK7	INF.	42Ω	0Ω	1.5 Meg.	470Ω	100KΩ	20Ω	100KΩ
2	12SA7GT	INF.	14Ω	100KΩ	100KΩ	22KΩ	.4Ω	0Ω	1.5 Meg.
3	12SK7GT	INF.	29Ω	1.5 Meg.	1.5 Meg.	0Ω	100KΩ	14Ω	100KΩ
4	12SQ7	INF.	10 Meg.	0Ω	0Ω	560KΩ	370KΩ	42Ω	.54Ω
5	35L6GT	INF.	90Ω	100KΩ	100KΩ	680KΩ	0Ω	54Ω	180Ω
6	35Z5GT	INF.	120Ω	110Ω	INF.	110Ω	0Ω	90Ω	100KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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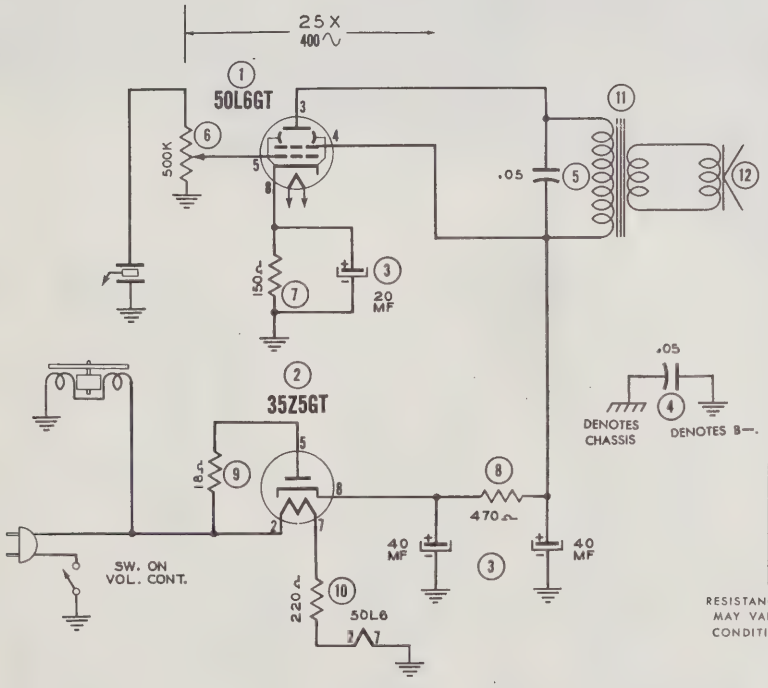
4821-21

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

TELE-TONE MODEL 182

TRADE NAME	Tele-Tone, Model 182
MANUFACTURER	Tele-Tone Radio Co., 540 W. 58th St., New York 19, N.Y.
TYPE SET	AC Operated Phono Player with 2 Tube Amplifier
TUBES (TWO)	Types, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC RATING .23 Amp. @ 117 Volts AC



Pin No.	50L6GT Volt.	Res.
1	0V.	INF.
2	47VAC	4Ω
3	97VDC	6KΩ
4	110VDC	6KΩ
5	0V.	500KΩ
6	0V.	INF.
7	0V.	0Ω
8	6.8VDC	150Ω

Pin No.	35Z5GT Volt.	Res.
1	0V.	INF.
2	117VAC	36Ω
3	108VAC	.4Ω
4	0V.	INF.
5	112VAC	54Ω
6	0V.	INF.
7	80VAC	6Ω
8	137VDC	6KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4821-22

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at minimum, no signal applied for voltage measurements.

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DATE 12/48-#4821-22 SET #51-FOLDER #22

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		TELE-TONE PART No.	STANDARD REPLACEMENT		
1	Power Output	50L6GT	50L6GT	7AC	
2	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	TELE-TONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
3A	40	150		PRSA-50502	EDL-5315C	DSB-305	TA-309	Filter-Blue
B	40	150						" -Red
C	20	150						Cathode Bypass-Yellow
4	.05	400		484-05	GT4S5	ST-4-05	TC-15	Isolation
5	.05	200		484-05	GT2S5	ST-4-05	TC-15	Output Plate Bypass

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	TELE-TONE PART No.	IRC PART No.	CLAROSTAT PART No.	
6A	500KΩ	½	A-VC-1	D13-133*	M-60-Z*	Volume Control
B	Shaft		Not Req.	A	Not Req.	Attach to 6A per instructions
C	Switch		" "	41	SW-A	" " " " "

*Install a 47KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Controls viewed from shaft side, terminals down.)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	TELE-TONE PART No.	IRC PART No.	
7	150Ω	½		BW-½-150	Br.-Grn.-Br. Output Cathode
8	470Ω	2		BT-2-470	Yl.-Vi.-Br. Filter
9	18Ω	½		BW-½-18	Br.-Gray-Blk. Rectifier Ballast
10	220Ω	5		ABA-250	Line Dropping-See Note

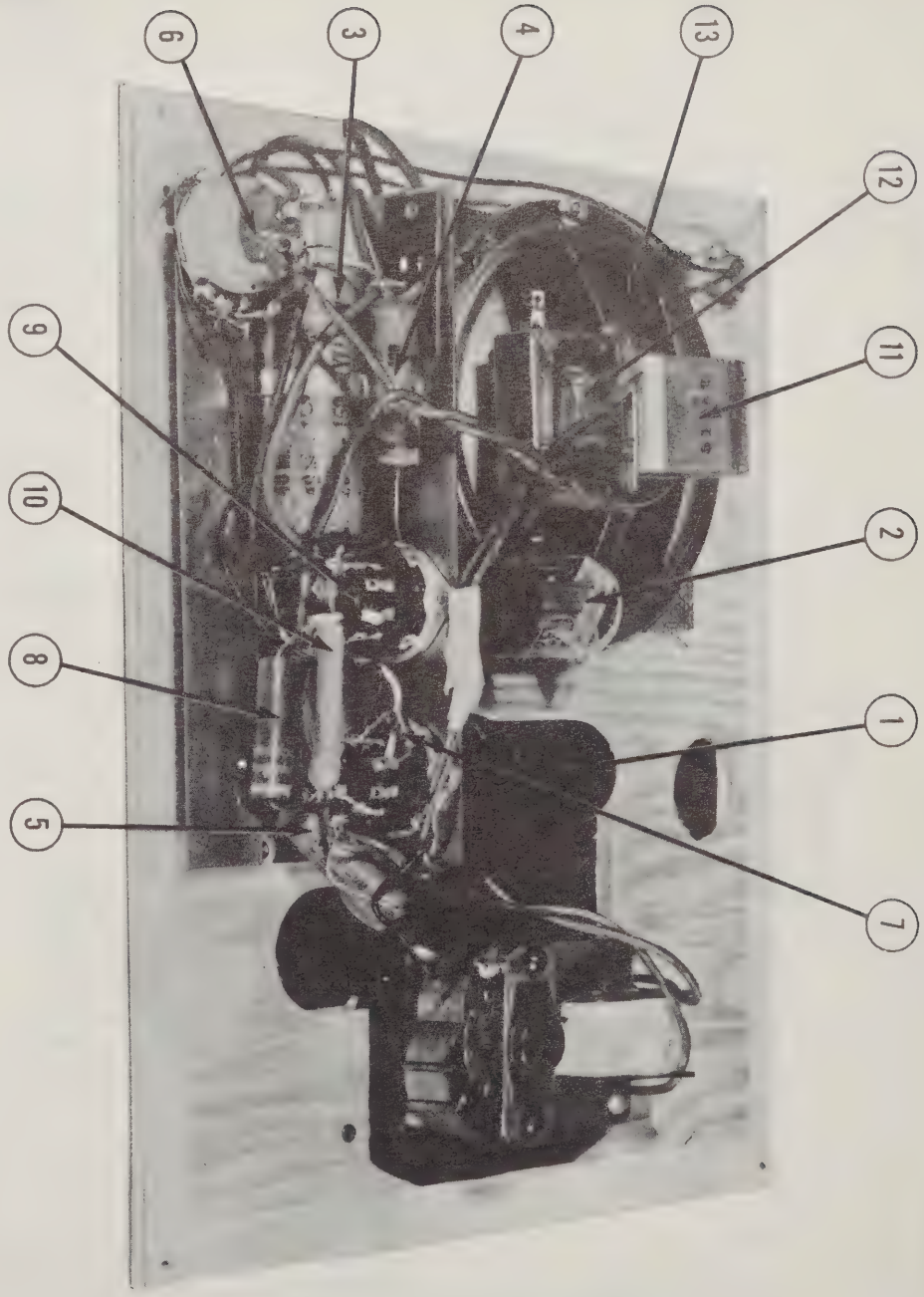
Note-On IRC replacement set slider at 220Ω from one end.

TRANSFORMER (OUTPUT)

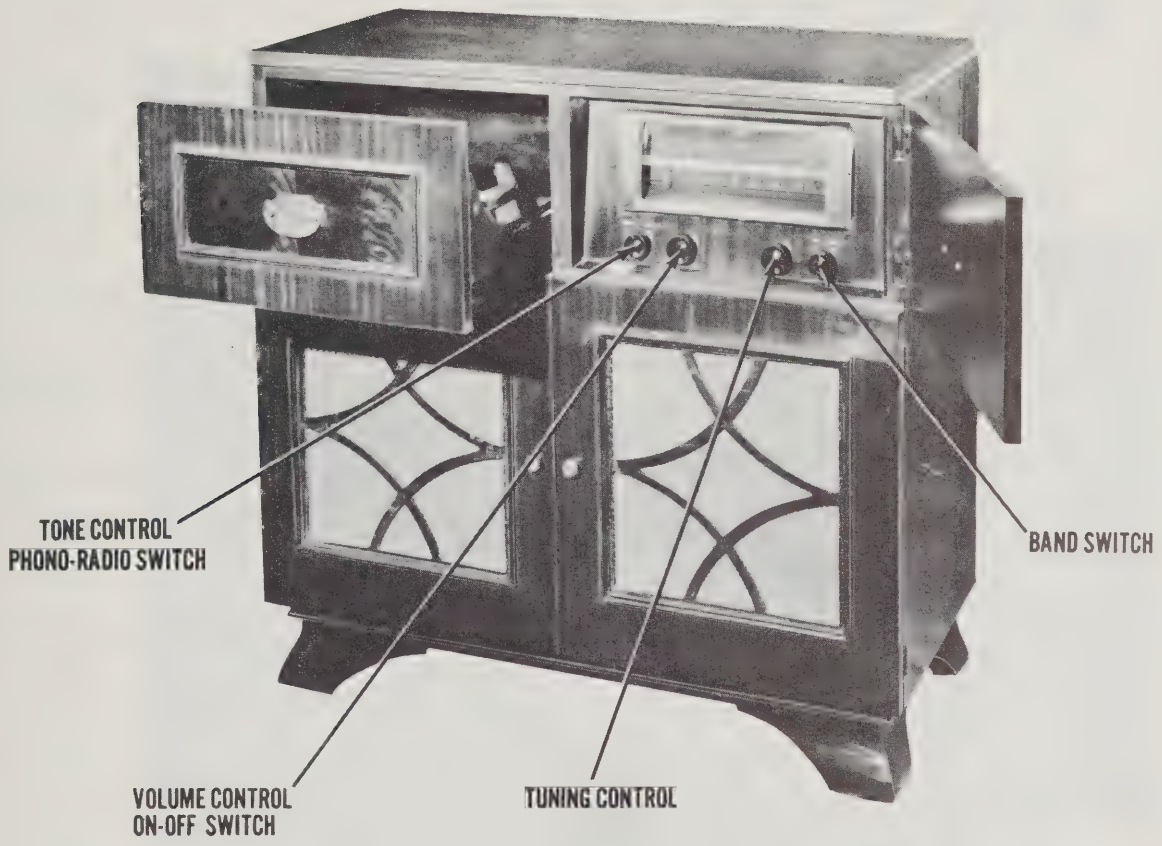
ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		TELE-TONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
11	2900Ω	3.2Ω	250Ω	.8Ω	H-TR3	A-3876#	T22S46#	A-2928#	#Bend mounting tabs down, file out slots and mount on original bracket.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			TELE-TONE PART No.	JENSEN PART No.	QUAM PART No.	
12	FIELD	VC IMP.		ST-105		
	PM	3.2Ω		Mod. P5-X	5A1	
13	CONE DIA.	VC DIA.				
	4-5/8"	9/16"				



TRUETONE MODEL
D1850 (Series A)



TRUETONE MODEL
D1850 (Series A)

TRUETONE MODEL D1850

TRADE NAME	Truetone, Model D1650 (Series A)
MANUFACTURER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Ant.
TUBES (TEN)	Types, 6BA6 RF Amp., 12AT7 Converter, 6BA6 1st IF Amp., 6BA6 2nd IF Amp., 6AL5 FM Det., 6AT6 AM Det.-AVC-AF, 6SN7GT AF-Phase Inv., (2) 6V6 Power Output, 5U4G Rectifier.
POWER SUPPLY	105-125 Volts AC
RATING	.92 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC FREQ. MOD. 87-109MC

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 7, Indiana

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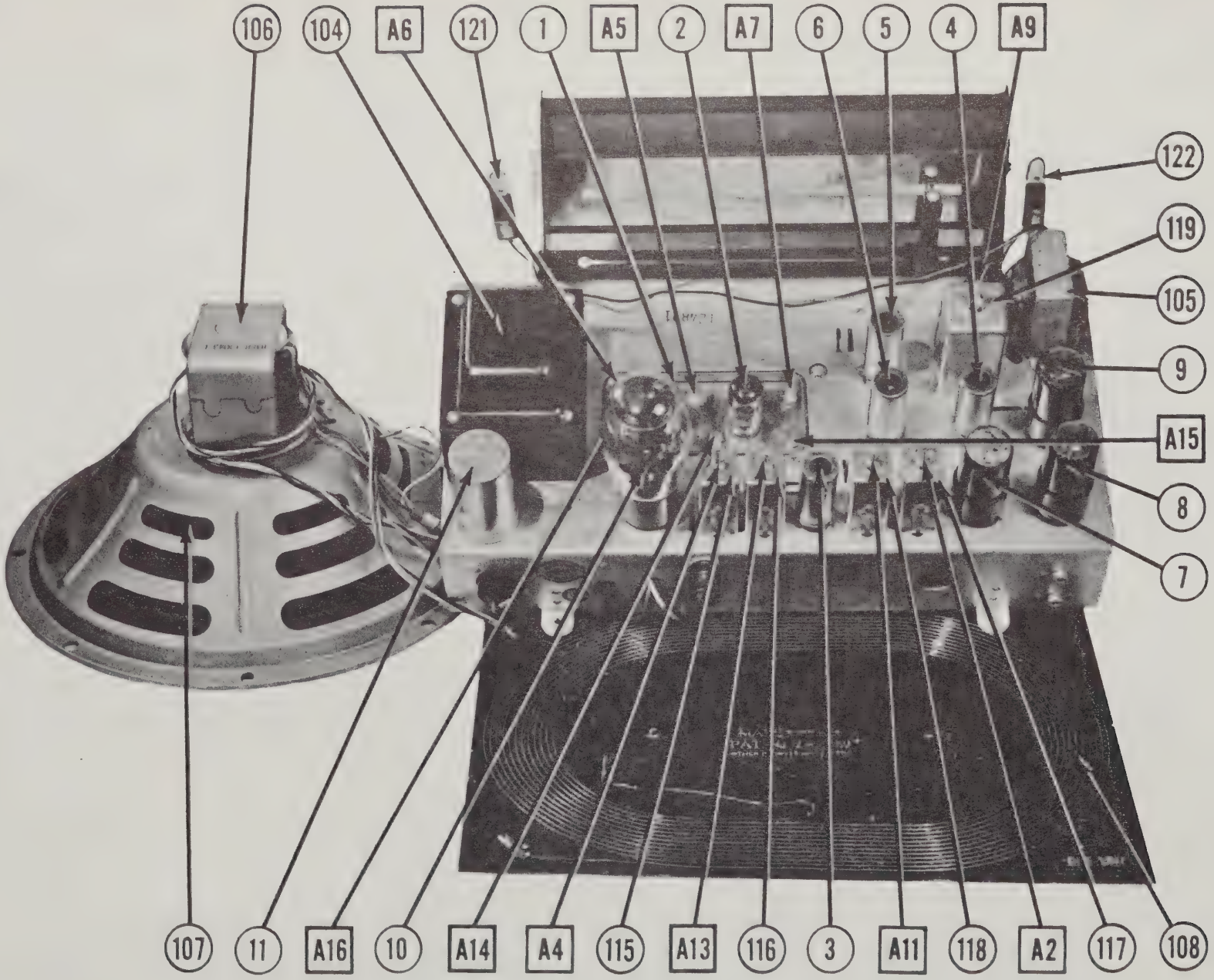
DATE 12/48-#4821-23 SET #51-FOLDER #23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104
A6
121
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A15
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7
107
11
A16
10
A14
A4
115
A13
116
3
A11
118
A2
117
108

TRUETONE MODEL
D1850 (Series A)
PAGE 3

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	6BA6	6BA6	7BK	
2	Converter	12AT7	12AT7		
3	1st IF Amp.	6BA6	6BA6	7BK	
4	2nd IF Amp.	6BA6	6BA6	7BK	
5	FM Det.	6AL5	6AL5	6BT	
6	AM Det.-AVC-AF	6AT6	6AT6	7BT	
7	AF-Phase Inv.	6SN7GT	6SN7GT	8BD	
8	Power Output	6V6	6V6	7AC	
9	" "	6V6	6V6	7AC	
10	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
11A	30	450	B-8C-11629	AF88J	UP3345	DY-2x30-450	EL-240	▲ Filter
B	30	450						▲ "
12	10	450	A-8C-12154	PRS450/10	BR1045	M-10-450	UT-12	RF Decoupling
13	10	50	A-8C-13132	PRS50/10	BR105	M-10-50	TA-510	Stabalizing Cap.
14	.02	600	C-8J-11321	684-02	GT6S2	MPH-6-02	TC-12	Line Filter
15	.002	600	C-8D-10789	684-002	GT6D2	ST-6-002	TC-22	Output Plate Bypass
16	.1	400	C-8D-10760	484-.1	GT4P1	ST-4-1	TC-1	Audio Coupling
17	.1	400	C-8D-10760	484-.1	GT4P1	ST-4-1	TC-1	" "
18	.05	400	C-8D-10813	484-05	GT4S5	ST-4-05	TC-15	" "
19	.05	400	C-8D-10813	484-05	GT4S5	ST-4-05	TC-15	" "
20	.02	200	C-8D-11304	484-02	GT2S2	ST-4-02	TC-12	" "
21	.05	200	C-8D-10770	484-05	GT2S5	ST-4-05	TC-15	" "
22	.006	600	C-8D-10785	684-006	GT6D6	ST-6-006	TC-26	Tone Compensation
23	.006	600	C-8D-10785	684-006	GT6D6	ST-6-006	TC-26	" "
24	.25	400	C-8D-13439	484-.25	GT4P25	ST-4-25	TC-2	AF Plate Decoupling
25	.01	400	C-8D-10761	484-01	GT4S1	ST-4-01	TC-11	2nd IF Screen Bypass
26	.003	600	C-8D-11013	684-003	GT6D3	ST-6-003	TC-23	2nd IF Plate Decoup.
27	.01	400	C-8D-10761	484-01	GT4S1	ST-4-01	TC-11	2nd IF Cathode Bypass
28	.05	200	C-8D-15860	484-05	GT2S5	ST-4-05	TC-15	Fil. Bypass
29	.006	600	C-8D-10785	684-006	GT6D6	ST-6-006	TC-26	1st IF Plate Decoup.
30	.006	600	C-8D-10785	684-006	GT6D6	ST-6-006	TC-26	1st IF Screen Byp.
31	.05	200	C-8D-10770	484-05	GT2S5	ST-4-05	TC-15	1st IF Cathode Byp.
32	.006	600	C-8D-10785	684-006	GT6D6	ST-6-006	TC-26	Conv. Plate Decoup.
33	.02	200	C-8D-11304	484-02	GT2S2	ST-4-02	TC-12	AVC Filter
34	.02	200	C-8D-11304	484-02	GT2S2	ST-4-02	TC-12	Fil. Bypass
35	330	300	C-8G-11741	1468-0003	5W5T3	MO.5-33	1FM-33	2nd AF Plate Byp.-Cer.
36	51	300	C-8G-13060	1468-00005	5W5Q5	MO.5-45	1FM-45	1st AF Plate Byp.- "
37A	50	500	A-8F-13047	1468-00005	5W5Q5	MO.5-45	1FM-45	Diode RF Filter
B	50	500		1468-00005	5W5Q5	MO.5-45	1FM-45	" " "
38	1500	300	C-8G-13059	1467-0015	1W5D15	MW.5-215	1FM-215	De-emphasis-Cer.
39	100	500	C-8F3-225	1468-0001	5W5T1	MO.5-31	1FM-31	RF Bypass
40	1000	300	C-8G-13201	1468-001	1W5D1	MW.5-21	1FM-21	FM Diode Load Cap.-Cer.
41	5000	300	A-8G-13962	1467-005	1D5D5	MW.5-25	1FM-25	RF Bypass Pwr. Supply "
42	100	300	C-8G-11734	1468-0001	5W5T1	MO.5-31	1FM-31	IF Coupling-Cer.
43	1000	500	C-8G-13201	1468-001	1W5D1	MW.5-21	1FM-21	Conv. Cath. Byp.-Cer.
44	2.2	300	A-8G-12495-4					Osc. Coupling-Cer.
45	15	300	C-8G-13017				MS-415	Osc. Grid Cap.-Cer.
46	5	300		1469-000005	5R5V5	MOS.5-55	MS-55	Osc. Coupling-Cer.
47	4	300	C-8G-15859					Fixed Trimmer- "
48	1000	300	C-8G-13201	1468-001	1W5D1	MW.5-21	1FM-21	Osc. Decoupling-Cer.
49	1000	300	C-8G-13201	1468-001	1W5D1	MW.5-21	1FM-21	Fil. Bypass "
50	470	300	C-8G-11732	1468-0005	5W5T5	MO.5-35	1FM-35	RF Coupling "
51	1500	300	C-8G-11731	1464-0015	1R5D15	MW.5-215		Fixed Trimmer "
52	15	300	C-8G-13017				MS-415	RF Coupling "
53	1000	300	C-8G-13201	1468-001	1W5D1	MW.5-21	1FM-21	Decoupling "
54	1000	300	C-8G-13201	1468-001	1W5D1	MW.5-21	1FM-21	RF Screen Byp. "
55	50	300	C-8G-11484	1468-00005	5W5Q5	MO.5-45	1FM-45	RF Cath. Byp. "
56	50	300	C-8G-11484	1468-00005	5W5Q5	MO.5-45	1FM-45	RF Coupling "
57	470	300	C-8G-11732	1468-0005	5W5T5	MO.5-35	1FM-35	Ant. Coupling "
58	1000	300	C-8G-13695	1468-001	1W5D1	MW.5-21	1FM-21	Ant. Loading "

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDAR'N PART No.	REPLACEMENT DATA: MERIT PART No.	INSTALLATION NOTES
105	10KΩ CT	3.6Ω	460Ω CT	.25Ω	B-12C-13042-1	A-3852	T22S87	A-2936	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
	FIELD RES.	VC IMP.				
106	550Ω	3.6Ω	B-16B-13043-1		12E60†	†Replace output transformer to match 6-8Ω voice coil.
	CONE DIA.	VC DIA.				
107	11-3/8"	1"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: MEISSNER PART No.	
108	Loop Ant.		.5Ω	C-13E-15687		
109	Ant.Coil BC		15.5Ω	B-13E-13031		
110	" " FM	0Ω	0Ω	B-13E-13028		
111	RF Coil BC		13.5Ω	B-13C-13032		
112	" " FM		0Ω	B-13C-13029		
113	Osc.Coil BC	1Ω	12Ω	A-13D-15704		
114	" " FM	0Ω	0Ω	B-13D-13027-1		
115	1st IF AM	5.5Ω*	21Ω	B-13A-15680		*Resistance between primary tap and B+
116	" " FM	1.2Ω	1.2Ω	B-13A-15682		
117	2nd IF AM	15.5Ω	23Ω	B-13B-15681		
118	" " FM	1.2Ω	1.2Ω	B-13B-15683		
119	FM Det.Tran.	2.3Ω	.2Ω	B-13M-15684		
120	RF Plate Choke FM		.2Ω			

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA	INSTALLATION NOTES
121-122	Bayonet	6-8	0.25	Blue	A-46A-11739 A-46A-11739		Type 44

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: ASTATIC PART No.	REMARKS
123		L-71	

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
124	Switch	B-20B-15628	Band
A5	Trimmer Strip	A-2M-12618	BC Osc. Adj.
A6			BC Ant. Adj.
A7			BC RF Adj.
A16			FM Ant. Adj.
A14	Trimmer	A-8H-15444	FM Osc. Adj.
A15	"	A-2M-14368	FM RF Adj.
	Dial Pointer	A-5M-13741	
	Dial Scale	C-30A-15686	
	Dial Glass	B-30B-13943	

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	
59A	500KΩ	½	A-10A-13114	D18-133X	AT-88	Volume Control tapped @ 50KΩ
B	Shaft		Not Req.	E	KSS-3	Attach to 59A per instructions
C	Switch		" "	41	SW-A	" " " "
60	500KΩ	½	A-11A-15645			Tone Control & Phono-Radio-Switch

RESISTORS

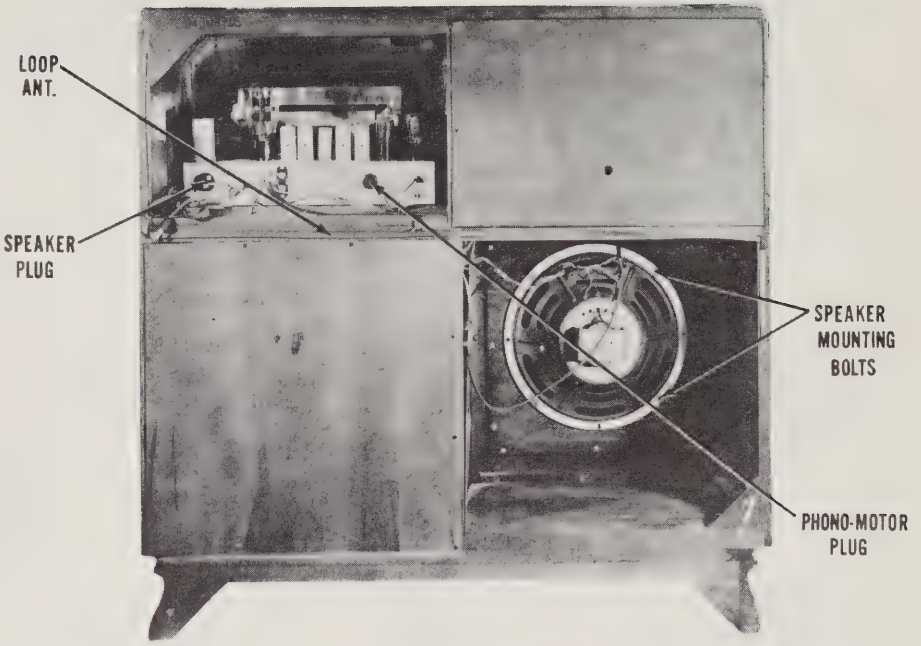
ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	TRUETONE PART No.	IRC PART No.	
61	22KΩ	½	C-9B1-21	BTS-22K	Red-Red-Or. Antenna Loading
62	1 Meg.	½	C-9B1-31	BTS-1 Meg.	Br.-Blk.-Grn. RF Grid
63	150Ω	½	C-9B1-52		Br.-Grn.-Br. RF Cathode
64	27KΩ	1	C-9B2-79	BTA-27K	Red-Vi.-Or. RF Screen Dropping
65	4700Ω	½	C-9B1-17	BTS-4700	Yl.-Vi.-Red RF Plate Load
66	3300Ω	1	C-9B2-6	BTA-3300	Or.-Or.-Red Decoupling
67	10KΩ	1	C-9B2-74	BTA-10K	Br.-Blk.-Or. Oscillator Plate Decoupling
68	100Ω	½	C-9B1-50		Br.-Blk.-Br. Parasitic Suppressor
69	10KΩ	½	C-9B1-19	BTS-10K	Br.-Blk.-Or. Oscillator Grid
70	1 Meg.	½	C-9B1-31	BTS-1 Meg.	Br.-Blk.-Grn. Converter Grid
71	1500Ω	½	C-9B1-64	BTS-1500	Br.-Grn.-Red Converter Cathode
72	39Ω	½	C-9B1-45		Or.-White-Blk. Parasitic Suppressor
73	2200Ω	1	C-9B2-15	BTA-2200	Red-Red-Red Converter Plate Decoupling
74	1 Meg.	½	C-9B1-31	BTS-1 Meg.	Br.-Blk.-Grn. 1st IF Grid
75	68Ω	½	C-9B1-48		Blue-Gray-Blk. 1st IF Cathode
76	39KΩ	1	C-9B2-81	BTA-39K	Or.-White-Or. 1st IF Screen Dropping
77	2200Ω	1	C-9B2-15	BTA-2200	Red-Red-Red 1st IF Plate Decoupling
78	68Ω	½	C-9B1-48		Blue-Gray-Blk. 2nd IF Cathode
79	39KΩ	1	C-9B2-81	BTA-39K	Or.-White-Or. 2nd IF Screen Dropping
80	1000Ω	½	C-9B1-13	BTS-1000	Br.-Blk.-Red 2nd IF Plate Decoupling
81	47KΩ	½	C-9B1-23	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
82	3.3 Meg.	½	C-9B1-34	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
83	27KΩ	½	C-9B1-79	BTS-27K	Red-Vi.-Or. De-emphasis
84	33KΩ	½	C-9B1-80	BTS-33K	Or.-Or.-Or. Ratio Detector Diode Load
85	470KΩ	½	C-9B1-94	BTS-470K	Yl.-Vi.-Yl. Bias Network
86	15 Meg.	½	C-9B1-302	BTS-15 Meg.	Br.-Grn.-Blue " "
87	470KΩ	½	C-9B1-94	BTS-470K	Yl.-Vi.-Yl. AVC Network
88	6.8 Meg.	½	C-9B1-36	BTS-6.8 Meg.	Blue-Gray-Grn. Series Recorder-See Note
89	33KΩ	½	C-9B1-80	BTS-33K	Or.-Or.-Or. Tone Compensation
90	4.7 Meg.	½	C-9B1-35	BTS-4.7 Meg.	Yl.-Vi.-Grn. 1st AF Grid
91	100KΩ	½	C-9B1-86	BTS-100K	Br.-Blk.-Yl. 1st AF Plate Load
92	56KΩ	½	C-9B1-83	BTS-56K	Grn.-Blue-Or. 1st AF Plate Decoupling
93	1 Meg.	½	C-9B1-31	BTS-1 Meg.	Br.-Blk.-Grn. 2nd AF Grid
94	3300Ω	½	C-9B1-68	BTS-3300	Or.-Or.-Red 2nd AF Cathode
95	51KΩ	½	C-9B1-200	BTS-47K	Grn.-Br.-Or. 2nd AF Plate Load
96	1 Meg.	½	C-9B1-31	BTS-1 Meg.	Br.-Blk.-Grn. Phase Inverter Grid
97	2200Ω	½	C-9B1-66	BTS-2200	Red-Red-Red Phase Inverter Cathode
98	51KΩ	½	C-9B1-200	BTS-47K	Grn.-Br.-Or. Phase Inverter Cathode
99	56KΩ	½	C-9B1-83	BTS-56K	Grn.-Blue-Or. Phase Inverter Plate Load
100	3300Ω	½	C-9B1-68	BTS-3300	Or.-Or.-Red Feedback
101	470KΩ	½	C-9B1-94	BTS-470K	Yl.-Vi.-Yl. Output Grid
102	470KΩ	½	C-9B1-94	BTS-470K	Yl.-Vi.-Yl. " "
103	270Ω	2	C-9B4-55	BW-2-270	Red-Vi.-Br. Output Cathode

Note-Not used in all models.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	TRUETONE PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
104A	117V AC @ .92A	640V CT .126A DC	5.3V AC @ 3.0A	6.2V AC @ 3.6A	B-12C-13042-1	P-8013‡	T22R05	P-2953 ‡
B					B-12A-13033-1			

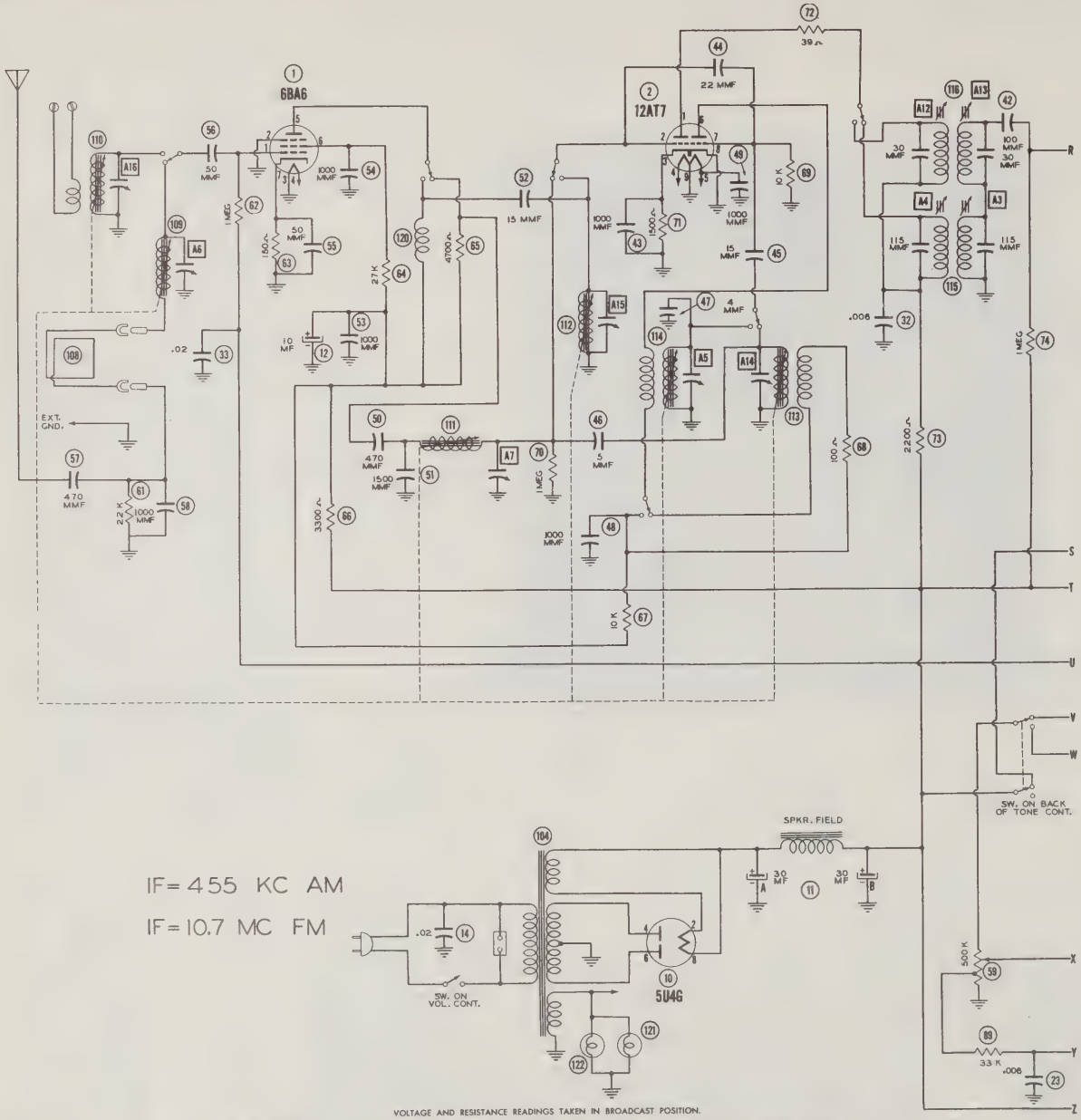
‡Add series resistor to reduce plate voltage.



DISASSEMBLY INSTRUCTIONS

1. Remove phono motor plug and phono pick-up plug from rear of chassis.
2. Disconnect FM dipole from terminal strip at rear of chassis and disconnect loop antenna at loop.
3. Disconnect speaker plug from rear of chassis.
4. Remove four Phillips head screws holding speaker. Remove speaker.
5. Remove four push-on type control knobs from front of cabinet.
6. Remove four metal type screws from under chassis. Remove chassis.

DATE 12/48-#4821-23 SET #51-FOLDER #23



IF = 455 KC AM

IF = 10.7 MC FM

VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.
RADIO-PHONO SWITCH IN RADIO POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
1	6BA6	0V.	0V.	6.2VAC	0V.	167VDC	113VDC	1VDC	-	-
‡ 2A	12AT7	270VDC	0V.	5.5VDC	6.2VAC	6.2VAC	140VDC	-7.6VDC§	0V.	0V.
2B	12AT7	270VDC	0V.	7.6VDC	6.2VAC	6.2VAC	125VDC	-6.6VDC	0V.	0V.
3	6BA6	0V.	0V.	6.2VAC	0V.	260VDC	108VDC	1VDC	-	-
4	6BA6	0V.	0V.	6.2VAC	0V.	270VDC	108VDC	1VDC	-	-
‡ 5	6AL5	0V.	-.4VDC	6.2VAC	0V.	-.2VDC	0V.	-.2VDC	-	-
6	6AT6	-.6VDC	0V.	6.2VAC	0V.	-.6VDC	-.6VDC	113VDC	-	-
7	6BN7GT	0V.	143VDC	5VDC	45VDC	180VDC	90VDC	6.2VAC	0V.	-
8	6V6	0V.	0V.	270VDC	280VDC	0V.	0V.	6.2VAC	18VDC	-
9	6V6	0V.	0V.	270VDC	280VDC	0V.	0V.	6.2VAC	18VDC	-
10	5U4G	0V.	355VDC	0V.	320VAC	0V.	320VAC	0V.	355VDC	-

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
1	6BA6	4.8 Meg.	0Ω	.1Ω	0Ω	58KΩ	80KΩ	150Ω	-	-
‡ 2A	12AT7	52KΩ	1 Meg.	1.5KΩ	.1Ω	.1Ω	65KΩ	10KΩ	0Ω	0Ω
‡ 2B	12AT7	52KΩ	0Ω	1.5KΩ	.1Ω	.1Ω	65KΩ	10KΩ	0Ω	0Ω
3	6BA6	4.6 Meg.	0Ω	.1Ω	0Ω	52KΩ	90KΩ	68Ω	-	-
4	6BA6	1.2Ω	0Ω	.1Ω	0Ω	50KΩ	90KΩ	68Ω	-	-
‡ 5	6AL5	0Ω	33KΩ	.1Ω	0Ω	INF.	0Ω	INF.	-	-
6	6AT6	4.7 Meg.	0Ω	.1Ω	0Ω	550KΩ	500KΩ	200KΩ	-	-
7	6BN7GT	1 Meg.	100KΩ	333Ω	1.1 Meg.	110KΩ	53KΩ	.1Ω	0Ω	-
8	6V6	0Ω	0Ω	50KΩ	50KΩ	470KΩ	INF.	.1Ω	270Ω	-
9	6V6	0Ω	0Ω	50KΩ	50KΩ	470KΩ	INF.	.1Ω	270Ω	-
10	5U4G	INF.	50KΩ	INF.	50Ω	INF.	50Ω	INF.	50KΩ	

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. **DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.**
2. **Socket connections are shown as bottom views.**
3. **Measured values are from socket pin to common negative.**
4. **Line voltage maintained at 117 volts for voltage readings.**
5. **Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.**
6. **Volume control at maximum, no signal applied for voltage measurements.**

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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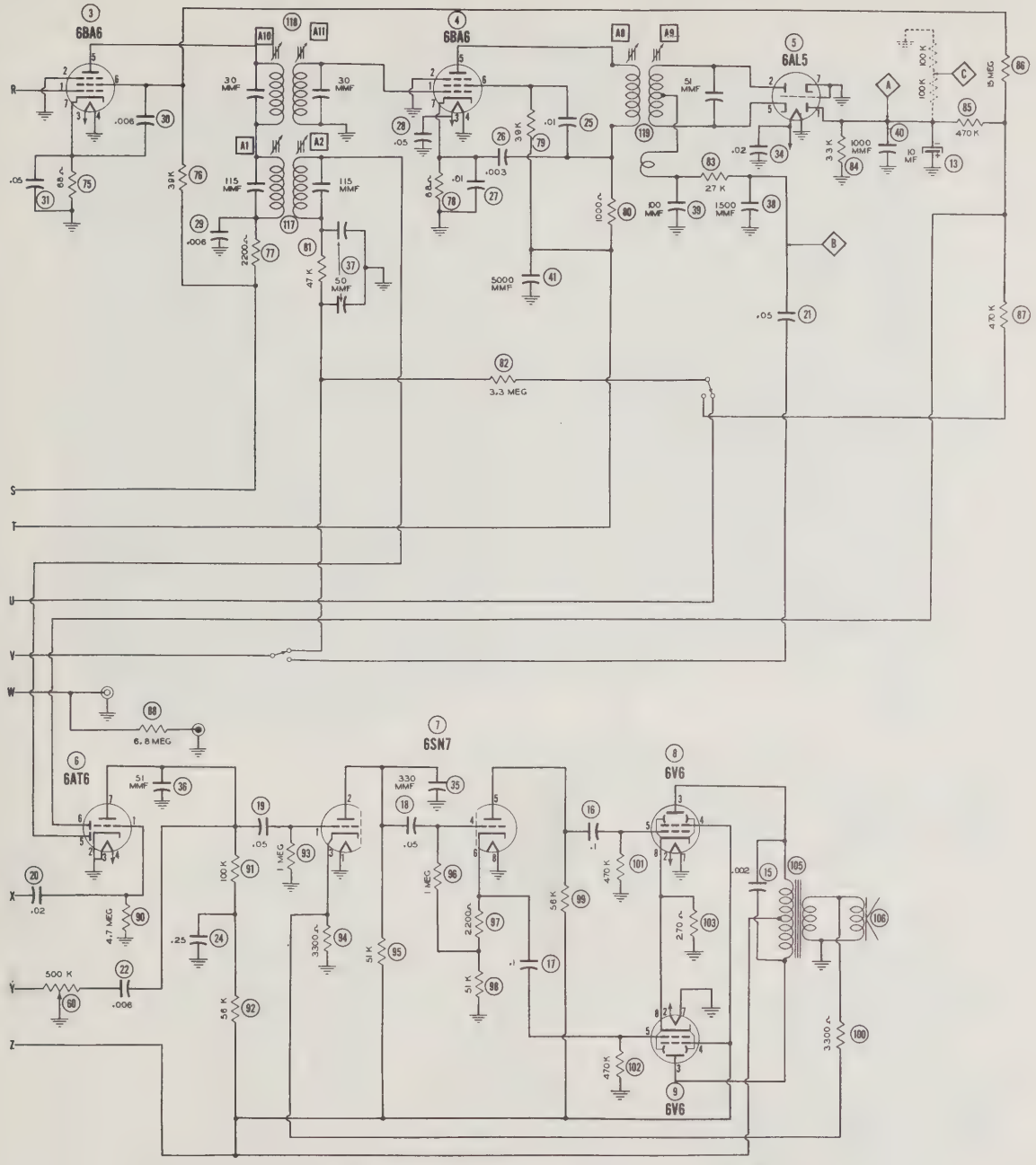
6BA6
6BA6
6AL5
6AT6
6SN7
6V6
6V6
30 MMF
30 MMF
115 MMF
115 MMF
51 MMF
.02
.05
.01
.003
.006
.008
.05
.01
.05
.05
.05
.05
.02
.25
.1
.1
.002
.006
.05
.02
.008
.05
.05
.05
.05

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer, turn tuning control fully clockwise and loosen screw at base of pointer slider. Set pointer to center of last reference mark at lower right end of dial and tighten screw.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to Pin 1 (grid) of 6BA6 1st IF Tube (3). Low side to chassis.	455KC	AM (Counter-clock-wise)	Tuning control fully clockwise	Across voice coil	A1,A2	Adjust for maximum output
2	.1 MFD.	High side to Pin 2 (grid) of 12AT7. Low side to chassis.	"	"	"	"	A3,A4	" " " "
3	200MMFD	High side to ext AM ant. lead. Low side to chassis.	1620KC	"	"	"	A5,A6, A7	Check positions of AM slugs which should extend 1½" from edge of coil winding. Adjust A5,A6 & A7 for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

In Step 6 connect two 100KΩ resistors in series from Point Ⓐ to chassis. These resistors must be within 5% of each other. The midpoint of the two resistors is Point Ⓑ.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4	.1 MFD.	High side to Pin 1 (grid) of 6BA6 2nd IF Tube (4). Low side to chassis.	10.7MC (Unmodulated)	FM (Clock-wise)	Tuning control fully clockwise.	DC probe to Point Ⓐ. Common to chassis	A8	Adjust for maximum output. Attenuate output of sig. gen. to give maximum deflection of 3 volts.
5	.1 MFD.	"	"	"	"	DC probe to Point Ⓑ. Common to Point Ⓒ	A9	Adjust for zero deflection. Repeat Steps 4 & 5 until no further improvement can be made.
6	.1 MFD.	High side to Pin 1 (grid) of 6BA6 1st IF Tube (3). Low side to chassis.	"	"	"	DC probe to Point Ⓐ. Common to chassis	A10, A11	Adjust for maximum deflection. Attenuate output of sig. gen. to give maximum deflection of 3 volts.
7	.1 MFD.	High side to Pin 2 (grid) of 12AT7. Low side to chassis.	"	"	"	"	A12, A13	Adjust for maximum deflection. Attenuate output of sig. gen. to give maximum deflection of 3 volts. Continue with FM-RF Alignment in Step 8.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE CONNECT	ADJUST	REMARKS
4	.01 MFD	High side to Pin 1 (grid) of 6BA6 1st IF Tube (3). Low side to chassis.	10.7MC (Freq. Mod.)	FM (Clock-wise)	Tuning control fully clockwise.	Vertical input to Point Ⓐ. Ground to chassis.	A8,A10 A11	Disconnect 10MFD. cap.(13) from Point Ⓐ. Adjust A8, A10 & A11 for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
5	.01 MFD	High side to Pin 2 (grid) of 12AT7. Low side to chassis.	"	"	"	"	A12, A13	Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1. Reconnect 10 MFD cap. to Point Ⓐ.
6	.01 MFD.	High side to Pin 1 (grid) of 6BA6 1st IF Tube (3). Low side to chassis.	"	"	"	Vertical input to Point Ⓑ. Ground to chassis.	A9	Adjust for maximum straightness of crossover lines with crossover occurring at center of pattern per Fig. 2.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8	300Ω carbon res.	High side to one FM ant. terminal. Low side to other FM ant. terminal.	100MC (Unmodulated)	FM	100MC	DC probe to Point Ⓐ. Common to chassis	A14	Check position of FM slugs which should extend 1-1/32" from end of coil forms. Adjust A14 for maximum deflection. Attenuate output of sig. gen. to give maximum deflection of 3 volts.
9	"	"	"	"	Tune for maximum deflection.	"	A15, A16	Rock tuning cap. and adjust for maximum deflection. Attenuate output of sig. gen. to give maximum deflection of 3 volts.

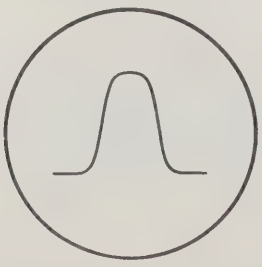

FIG. 1

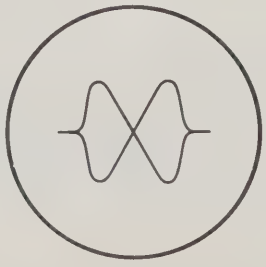

FIG. 2

TRUETONE MODEL D3722
(FACT. #472) BATTERY-LINE OPERATED

TRUETONE MODEL D3722
(FACT. #472) BATTERY-LINE OPERATED

TRUETONE MODEL D3722

TRADE NAME	Truetone, Model D3722 (Fact #472)
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	Three Power Operated Portable Superheterodyne Receiver with Loop Antenna
TUBES (FOUR)	Types, 1R5 Converter, 1U4 IF Amp., 1S5 Det.-AVC-AF, 3Q4 Power Output.
POWER SUPPLY RATING	105-125 Volts AC-DC or 7.5 Volts "A" Supply and 90 Volts "B" Supply in Pack Form .160 Amp. @ 117 Volts AC or 50 MA @ 7.5 Volts DC and 14MA @ 90 Volts DC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

There are five calibration marks on the dial backplate. These are in order from low to high freq. end; low freq. end limit, 600KC, 800KC, 1500KC and high freq. end limit. To set dial pointer turn tuning cap. fully closed and set pointer to low freq. end limit mark.

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1 MFD cap. in series with low side of the sig. gen. and B-.

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.2 MFD.	High side to large stator of tuning cap. Low side to chassis.	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy ant. to 200 MMF. to reduce hum modulation.
2		Loop	1500KC	1500KC calibration dot.	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	"	Tune for maximum output.	"	A6	Adjust for maximum output.

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DATE 12/48-#4821-24 SET #51-FOLDER #24

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		TRUETONE PART No.	STANDARD REPLACEMENT		
1	Converter	1R5	1R5	7AT	
2	IF Amp.	1U4	1U4	6AR	
3	Det.-AVC-AF	1S5	1S5	6AU	
4	Power Output	3Q4	3Q4	7BA	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
5A	50	150	2075	AF1010D4A	UP5515C	DY-307	EL-352	■ Filter
B	50	150						▲ "
C	20	25						Fil. Bypass
6	25	25		PRS25/25	BR252A	M-25-25	TA-25	" "
7	.05	200		484-05	GT2S5	ST-4-05	TC-15	Line Filter
8	.005	400		484-005	GT6D5	ST-6-005	TC-25	Output Plate Bypass
9	.001	600		684-001	GT6D1	ST-6-001	TC-21	Audio Coupling
10	.005	400		484-005	GT6D5	ST-6-005	TC-25	" "
11	.02	200		484-02	GT2S2	ST-4-02	TC-12	AF Screen Bypass
12	.2	200		484-.2	GT4P2	ST-4-2	TC-2	AF Plate Decoup Note 1
13	.1	200		484-.1	GT2P1	ST-2-1	TC-1	Fil. Bypass
14	.05	200		484-05	GT2S5	ST-4-05	TC-15	" "
15	.001	400		484-001	GT6D1	ST-6-001	TC-21	Ext. Ant. Isolation
16	.02	200		484-02	GT2S2	ST-4-02	TC-12	AVC Filter
17	.02	200		484-02	GT2S2	ST-4-02	TC-12	Osc. Decoupling
18	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	AF Plate Bypass
19	100	500		1468-0001	5W5T1	MO.5-31	1FM-31	Diode RF Filter
20	10	500		1469-00001	5R5Q1	MOS.5-41	MS-41	Fixed Trimmer-Note 2
21	10	500		1469-00001	5R5Q1	MOS.5-41	MS-41	" " " "

Note 1-In some models this capacitor may be .02 MFD. Replacement same as Item #11.
Note 2-Not used in all models.

CONTROLS

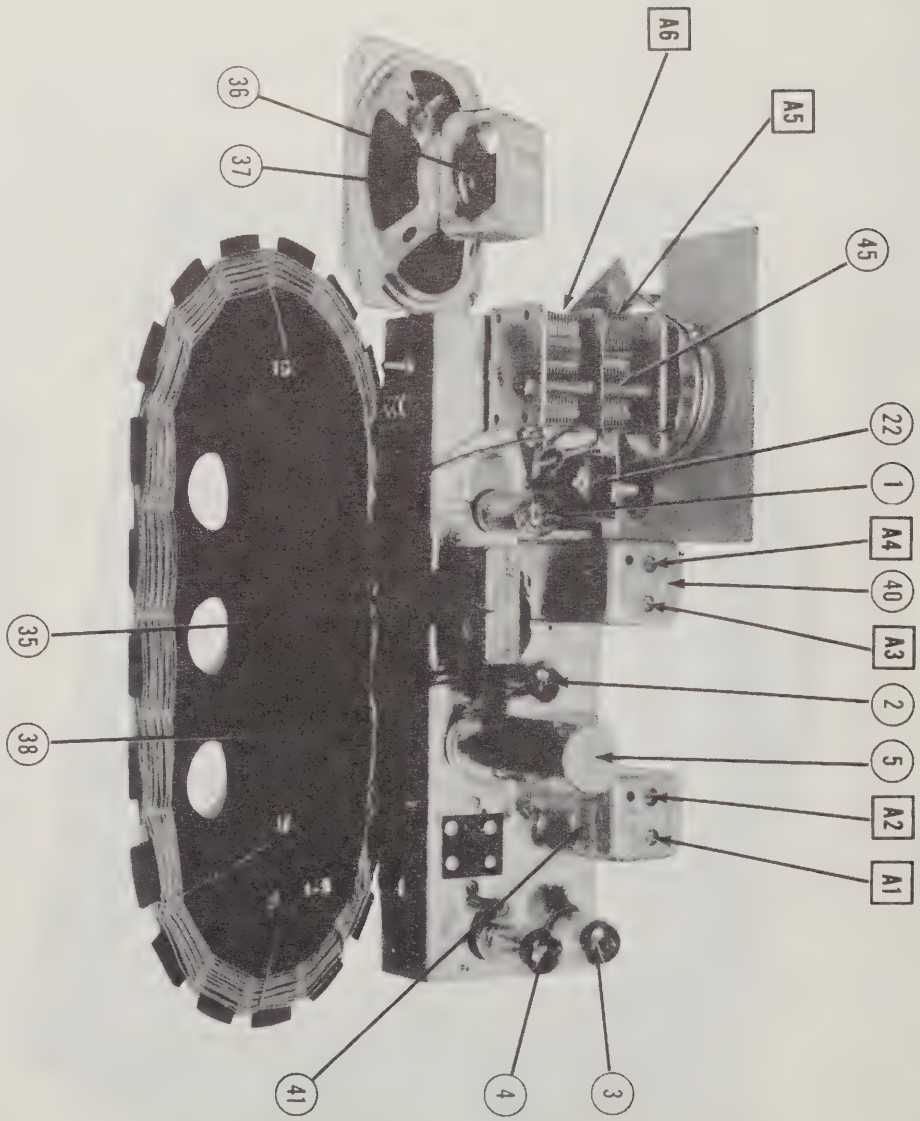
ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	
22A	1 Meg.	½		D13-137	M-63-2	Volume Control
B	Shaft			A	Not Req.	Attach to 22A per instructions
C	Switch			42	SW-A2	" " " " "

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	TRUETONE PART No.	IRC PART No.	
23	100KΩ	½		BTS-100K	Br.-Blk.-Yl. Osc. Grid
24	8200Ω	½		BTS-8200	Gray-Red-Red Osc. Decoupling
25	3.3 Meg.	½		BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
26	10 Meg.	½		BTS-10 Meg.	Br.-Blk.-Blue AF Grid
27	4.7 Meg.	½		BTS-4.7 Meg.	Yl.-Vi.-Grn. AF Screen
28	470KΩ	½		BTS-470K	Yl.-Vi.-Yl. AF Plate Load
29	330KΩ	½		BTS-330K	Or.-Or.-Yl. AF Plate Decoup.
30	270Ω	½		BW-½-270	Red-Vi.-Br. Filament String
31	820Ω	½		BTS-820	Gray-Red-Br. " "
32A	1500Ω	10		AB-1500	Filament Dropping
B	660Ω	10		ABA-750	Filter-See Note
33	33Ω	1		BW-1-33	Or.-Or.-Blk. Surge Limiter
34	2.2 Meg.	½		BTS-2.2 Meg.	Red-Red-Grn. Output Grid

Note-On IRC replacement set slider 660Ω from end.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		TRUETONE PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
35	8500Ω	3.3Ω	310Ω	.5Ω	1337	A-3878	T22S47	A-2932	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			TRUETONE PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	VC IMP.		ST-113		
36	PM	3.3Ω	5899	Mod. P4-X	4A07	
	CONE DIA.	VC DIA.				
37	4"	9/16"				

R F COILS

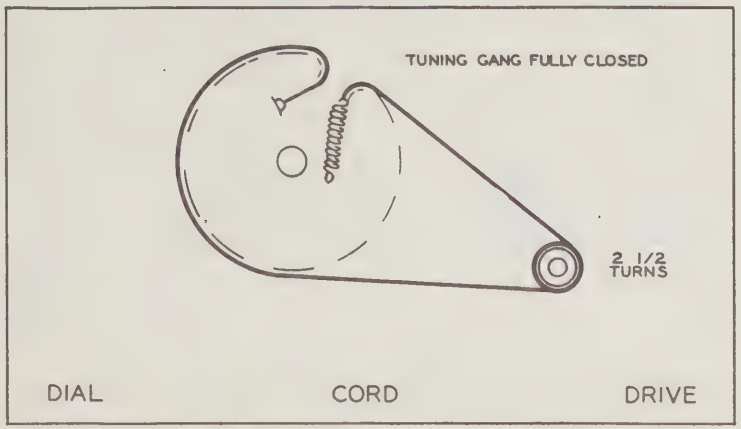
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	
38	Loop Ant.	0Ω	1.3Ω	28190		
39	Osc. Coil	1.6Ω	6Ω	28197		
40	Input IF	21Ω	21Ω	3371		
41	Output IF	31Ω	31Ω	3535		

BATTERIES

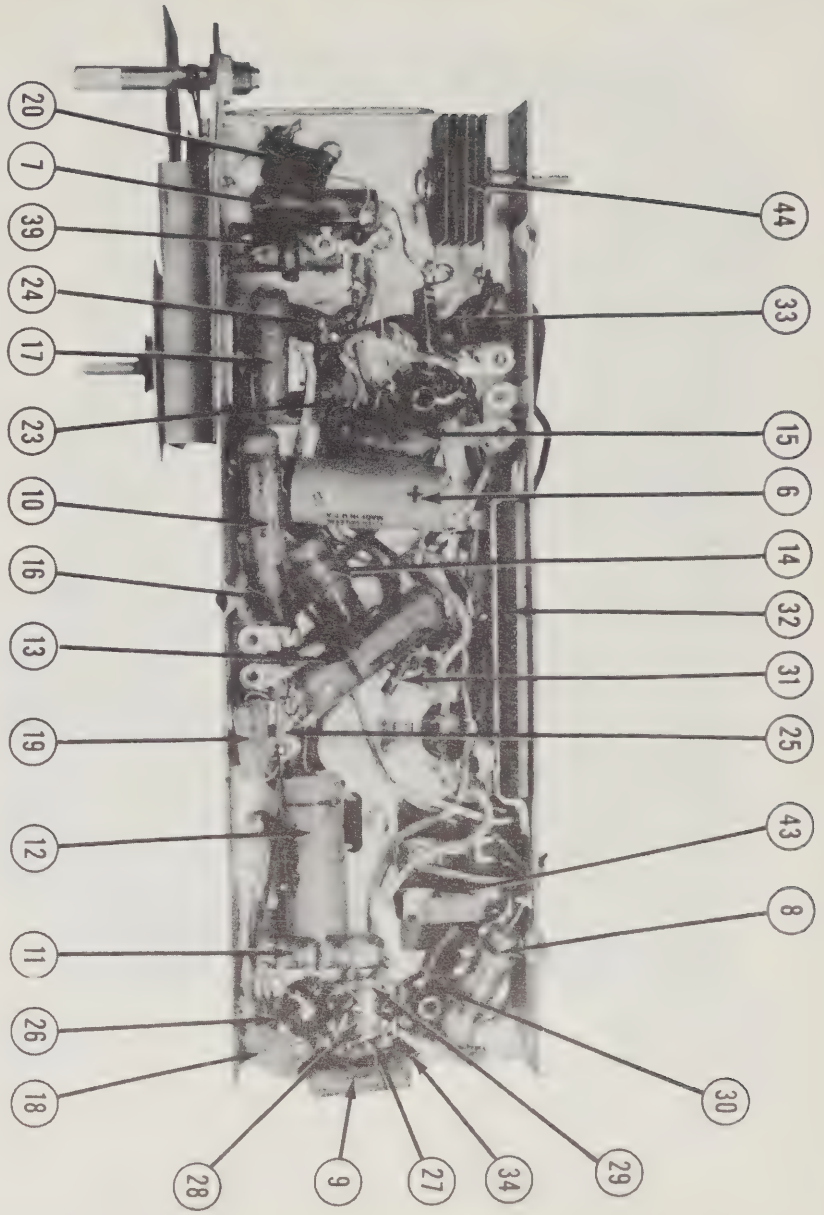
ITEM No.	VOLTAGE	TRUETONE PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
42	7.5V "A" 90V "B"				753			F6A60	

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
43	Switch	18132	
44	Rectifier		
45	2 Gang Var. Cap.	1694	
	Cabinet	472	
	Knob	39164	



CHASSIS—BOTTOM VIEW



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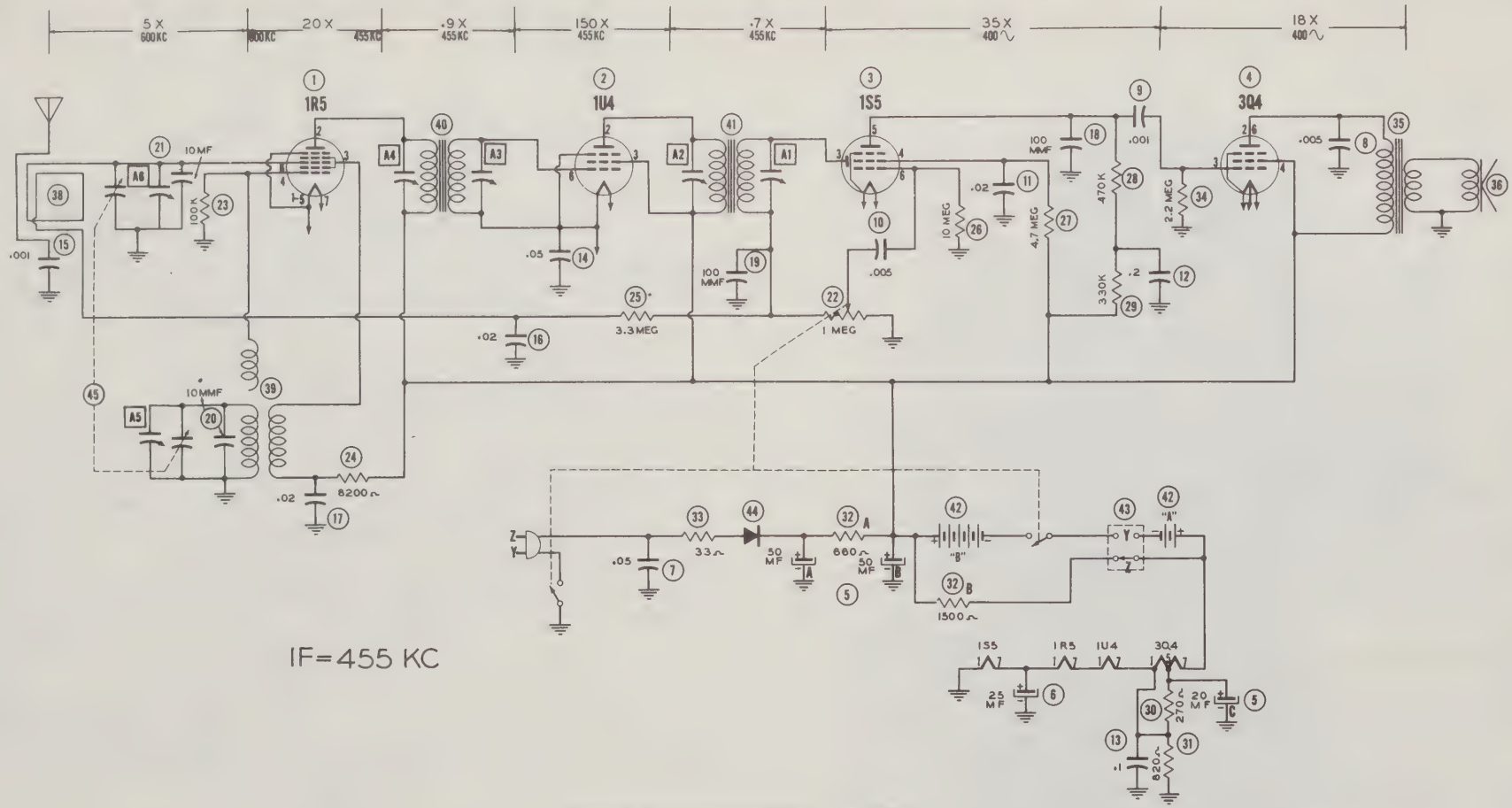
TRUETONE MODEL D3722

TRUETONE MODEL D3722



VOLTAGE AND RESISTANCE READINGS TAKEN IN AC-DC POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	1.8VDC	87VDC	70VDC	-7.4VDC§	1.8VDC	0V.	3.5VDC
2	1U4	3.5VDC	87VDC	87VDC	87VDC	3.5VDC	3.5VDC	5VDC
3	1S5	0Ω	60VDC	-.2VDC	15VDC	27VDC	0V.	1.8VDC
4	3Q4	5VDC	85VDC	0V.	87VDC	6.3VDC	85VDC	7.8VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	1R5	*	1.5KΩ	9.7KΩ	100KΩ	*	4.3 Meg.	*
2	1U4	*	1.5KΩ	1.5KΩ	1.5KΩ	*	*	*
3	1S5	0Ω	330KΩ	1 Meg.	4.7 Meg.	800KΩ	10 Meg.	*
4	3Q4	*	1.8KΩ	2.2 Meg.	1.5KΩ	*	1.5KΩ	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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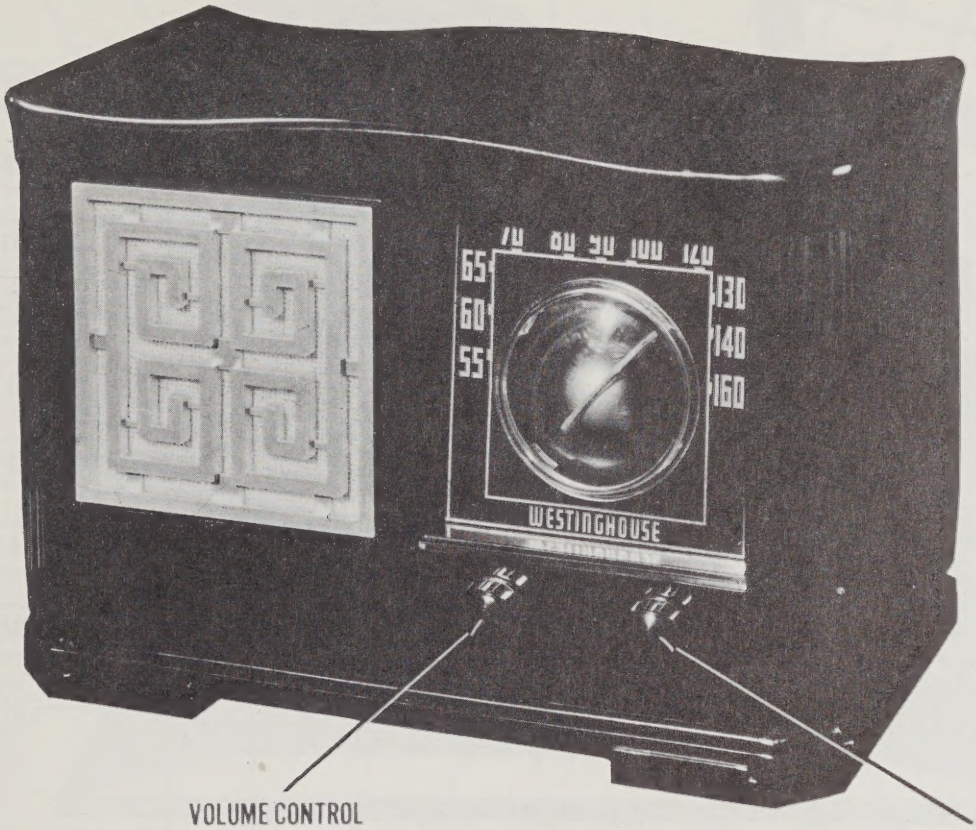
4821-24

The stage gain measured values listed above approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by shorting AVC to chassis.

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volts.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.

WESTINGHOUSE
MODEL H-188 (Ch. V-2133)



WESTINGHOUSE
MODEL H-188 (Ch. V-2133)

WESTINGHOUSE MODEL H-188

TRADE NAME	Westinghouse, Model H-188 (Ch.V-2133)
MANUFACTURER	Westinghouse Electric Corp., Receiver Div., Sunbury, Pa.
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES (FIVE)	Types, 12BE6 Converter, 12BA6 IF Amp., 12AT6 Det.-AVC-AF, 50B5 Power Output, 35W4 Rectifier.
POWER SUPPLY	105-120 Volts AC-DC
TUNING RANGE—BROADCAST	540-1600KC RATING .25 Amp. @ 117 Volts AC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

If it is impossible to obtain signal output with input connected to tuning cap., then it will be necessary to inject signal at Pin 1 (grid) of 12BA6 and adjust A1 & A2 for maximum output. Continue with Step 1.

Use isolation transformer if available. If not connect a .1 MFD capacitor in series with low side of signal generator and B-.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD.	High side to large stator of tuning cap. Low side to B-. (See prealignment notes).	455KC	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4	Adjust for maximum output. If isolation transformer is not transformer is not used reduce dummy ant. to .001 MFD. to reduce hum modulation.
2	.1	Loop	1615KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1400KC	Tune for maximum output.	"	A6	Rock tuning cap. and adjust A6 for maximum output.

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DATE 12/48-#4821-25 SET #51-FOLDER #25

PARTS LIST AND DESCRIPTIONS

WESTINGHOUSE MODEL H-188

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		WESTINGHOUSE PART No.	STANDARD REPLACEMENT		
1	Converter	12BE6	12BE6	7CH	
2	IF Amp.	12BA6	12BA6	7BK	
3	Det.-AVC AF	12AT6	12AT6	7BT	
4	Power Output	50B5	50B5	7BZ	
5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	WESTINGHOUSE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	SOLAR PART No.	SPRAGUE PART No.	
6A	50	150	V-4044	PRSA150/30-50	EDL5315	DSB-5030-150	TA-530	Filter-Red
B	30	150					"	-Green
7	.05	400	RCP10W4503A	484-05	GT4S5	ST-4-05	TC-15	Line Filter
8	.05	400	V-5618-1				72P1	Line Isolation-Note
9	.01	400	RCP10W4103A	484-01	GT4S1	ST-4-01	TC-11	Audio Coupling
10	.002	600	RCP10W6202A	684-002	GT6D2	ST-6-002	TC-22	" "
11	.05	400	RCP10W4503A	484-05	GT4S5	ST-4-05	TC-15	AVC Filter
12	.03	400	RCP10W4303A	484-03	GT4S3	ST-4-03	TC-13	Output Plate Bypass
13	47	500	RCM20A470M	1468-00005	5W5Q5	MO.5-45	1FM-45	Diode RF Filter
14	47	500	RCM20A470M	1468-00005	5W5Q5	MO.5-45	1FM-45	" " "
15	100	500	RCM20A101M	1468-0001	5W5T1	MO.5-31	1FM-31	RF Coupling
16	470	500	RCM20A471M	1468-0005	5W5T5	MO.5-35	1FM-35	AF Plate Bypass

Note-Special resonant capacitor.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESIST-ANCE	WATTS	WESTING. PART No.	IRC PART No.	CLAROSTAT PART No.	
17A	500KΩ	½	V-5833	D13-133	AM-60-Z	Volume Control
B	Shaft		Not Req.	E	KSS-3	Attach to 17A per instructions
C	Switch		" "	41	SW-A	" " " " "

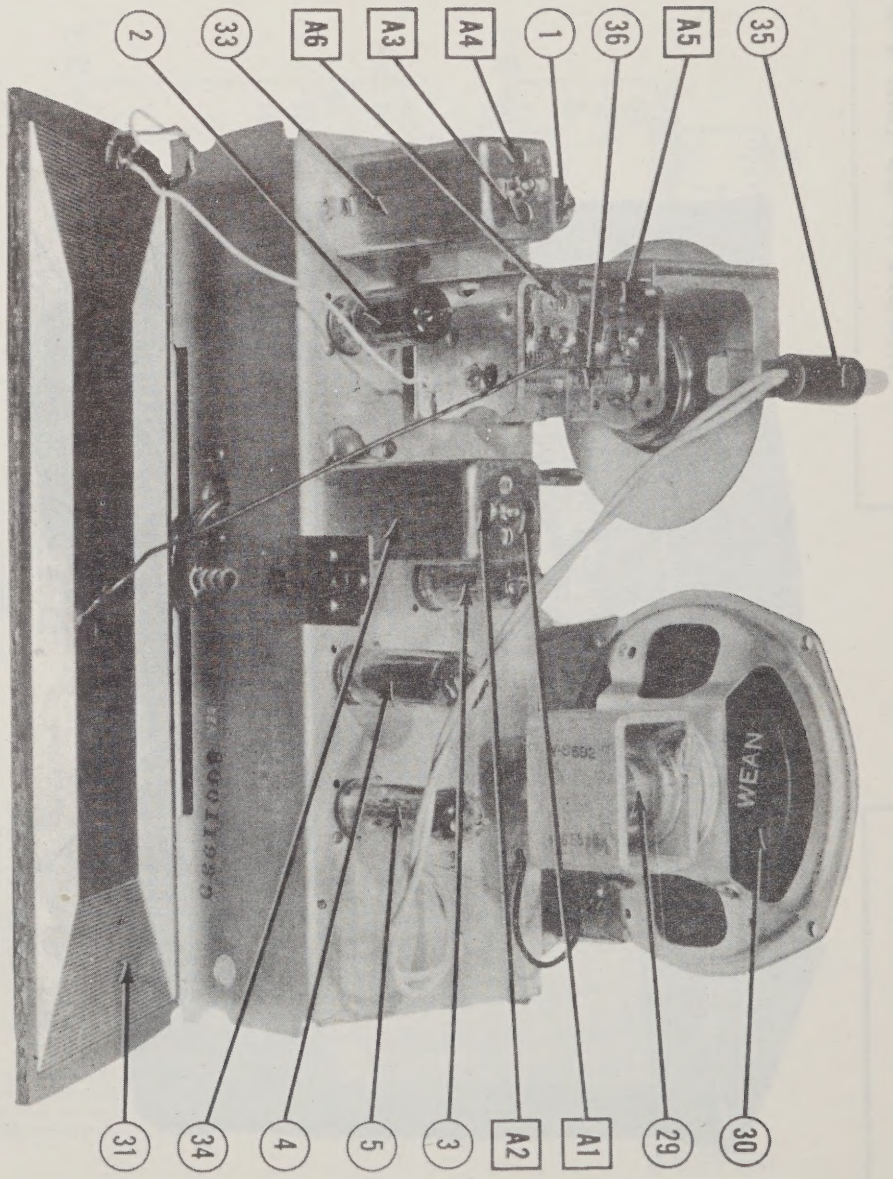
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	WESTINGHOUSE PART No.	IRC PART No.	
18	1 Meg.	½	RC20AE105M	BTS-1 Meg.	Br.-Blk.-Grn. Converter Grid
19	22KΩ	½	RC20AE223M	BTS-22K	Red-Red-Or. Oscillator Grid
20	4.7 Meg.	½	RC20AE475M	BTS-4.7 Meg.	Yl.-Vi.-Grn. AVC Network
21	47KΩ	½	RC20AE473M	BTS-47K	Yl.-Vi.-Or. Diode RF Filter
22	10 Meg.	½	RC20AE106M	BTS-10 Meg.	Br.-Blk.-Blue AF Grid
23	330KΩ	½	RC20AE334M	BTS-330K	Or.-Or.-Yl. AF Plate Load
24	470KΩ	½	RC20AE474K	BTS-470K	Yl.-Vi.-Yl. Output Grid
25	120Ω	½	RC20AE121K	BW-½-120	Br.-Red-Br. Output Cathode
26	1200Ω	1	RC30AE122K	BTA-1200	Br.-Red-Red Filter
27	220KΩ	½	RC20AE224M	BTS-220K	Red-Red-Yl. Line Isolation

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		WESTING. PART No.	STANCOR PART No.	THORDAR'N PART No.	MERIT PART No.	
	PRI.	SEC.	PRI.	SEC.					
28	2350Ω	3.3Ω	240Ω tapped @ 15Ω	.5Ω	V-5775-1	A-3330		A-3031	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA WESTINGHOUSE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	VC IMP.		ST-105		
29	PM	3.3Ω	V-5682	Mod. P5-X	5A15	
	CONE DIA.	VC DIA.				
30	4"	9/16"				

R F COILS

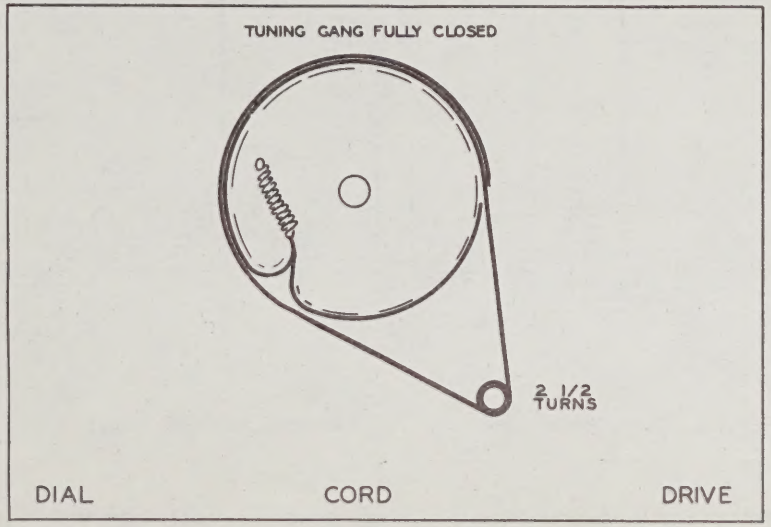
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA WESTINGHOUSE PART No.	REPLACEMENT DATA MEISSNER PART No.	
31	Loop Ant.		2.5Ω			
32	Osc. Coil	.8Ω	12.5Ω	V-5851	14-1060†	†Add 50 MMFD cap. from high side of tuning cap. to osc. grid.
33	Input IF	25Ω	26.5Ω	V-5685	16-6666	
34	Output IF	26Ω	25.8Ω	V-5686	16-6667	

DIAL LIGHT

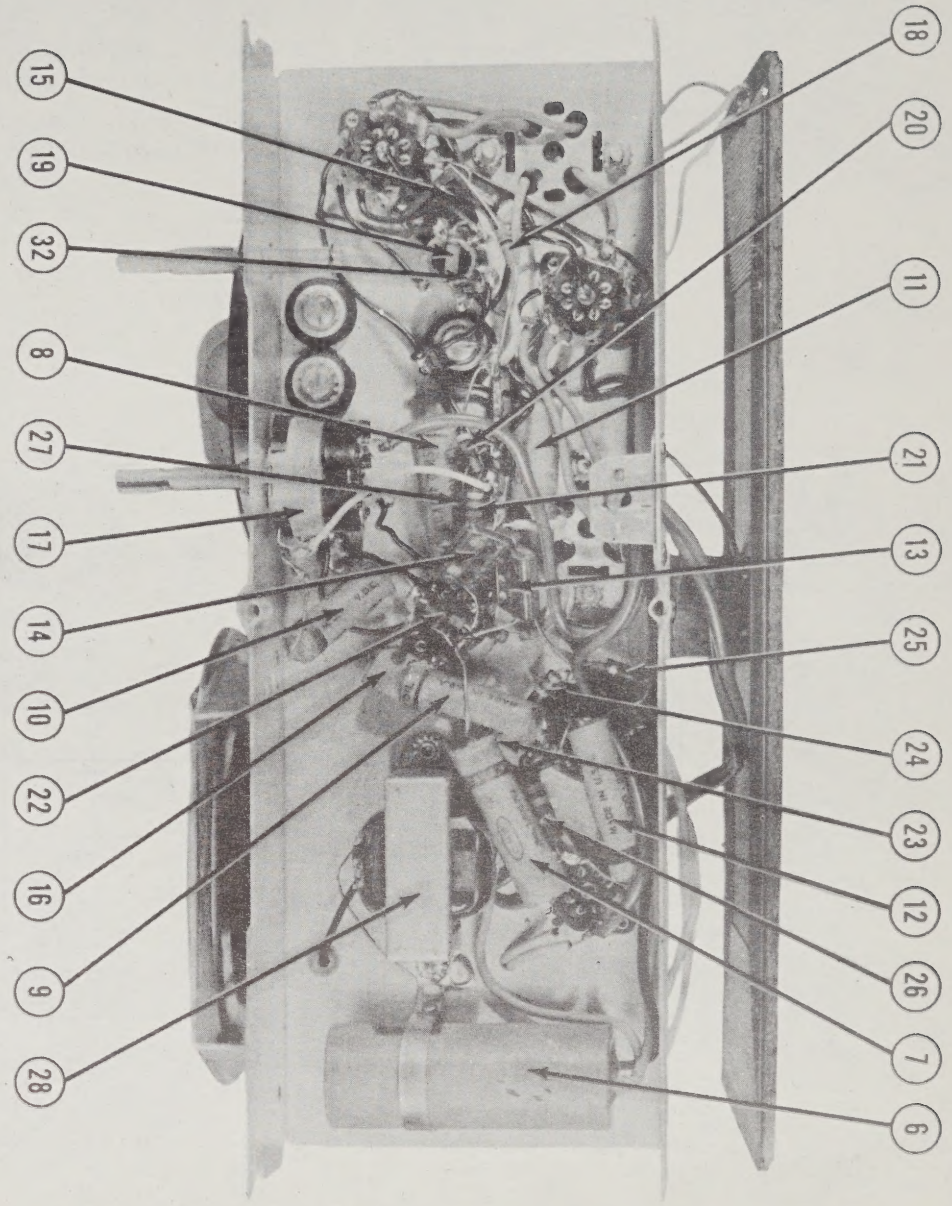
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA WESTINGHOUSE PART No.		INSTALLATION NOTES
35	Bayonet	6-8	0.15	Brown			Type 47

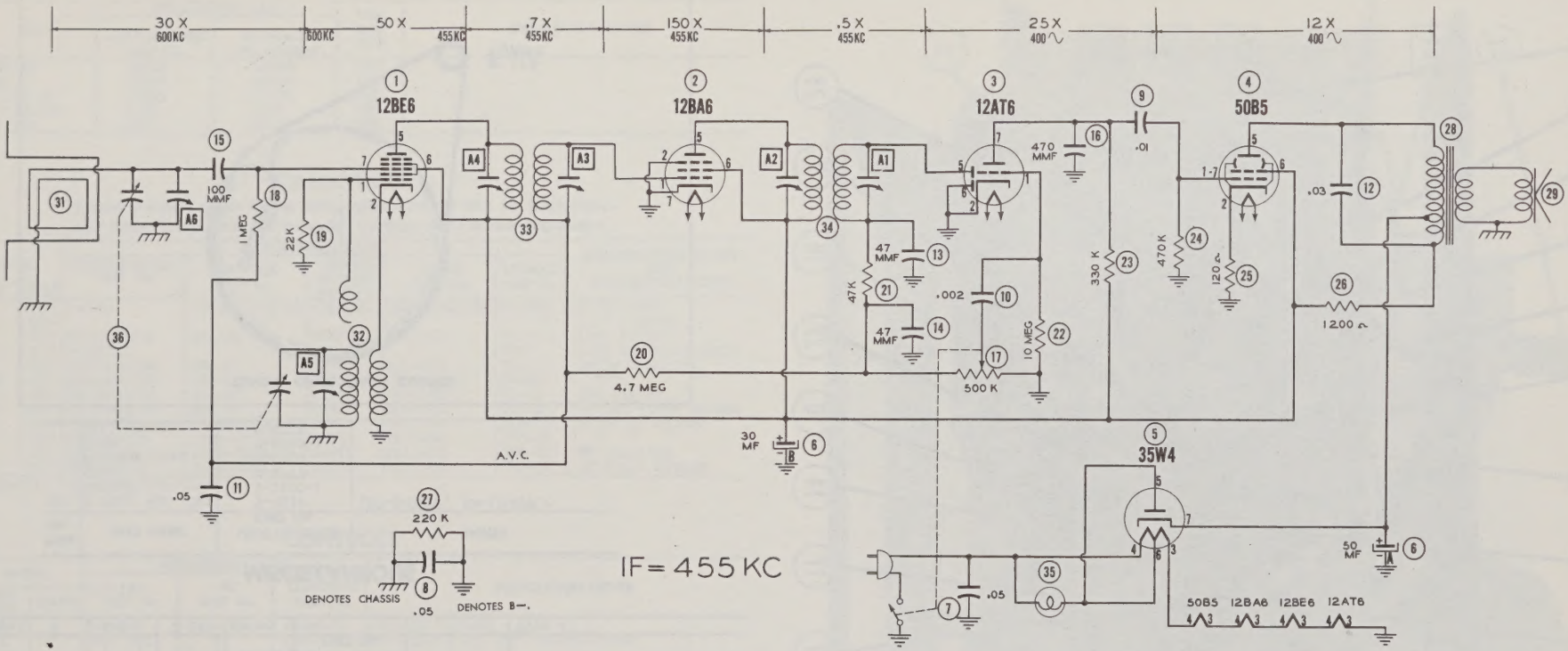
MISCELLANEOUS

ITEM No.	PART NAME	WESTINGHOUSE PART No.	NOTES
36	2 Gang Var. Cap.	V-5819	(27-392MMF, 19-110MMF)
	Cabinet	V-1160-1	
	Dial	V-5777	
	Pointer Disc	V-5784	
	Knob	V-5780-1	
	Dial Window	V-5776	



CHASSIS—BOTTOM VIEW





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	-4.4VDC§	0V.	12VAC	25VAC	90VDC	90VDC	-.4VDC
2	12BA6	-.5VDC	0V.	25VAC	39VAC	90VDC	90VDC	0V.
3	12AT6	-.8VDC	0V.	0V.	12VAC	-.5VDC	0V.	40VDC
4	50B5	.1VDC	5VDC	39VAC	90VAC	115VDC	90VDC	.1VDC
5	35W4	0V.	90VDC	90VAC	117VAC	113VAC	113VAC	125VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
1	12BE6	22KΩ	.8Ω	13Ω	25Ω	50KΩ	50KΩ	6.2 Meg.
2	12BA6	5.2 Meg.	0Ω	25Ω	38Ω	50KΩ	50KΩ	0Ω
3	12AT6	10 Meg.	0Ω	0Ω	13Ω	550KΩ	0Ω	380KΩ
4	50B5	470KΩ	120Ω	38Ω	90Ω	50KΩ	50KΩ	470KΩ
5	35W4	INF.	50KΩ	90Ω	115Ω	110Ω	110Ω	50KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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4821-25

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.